

Undergraduate Council (UGC)

Wednesday, March 18, 2015, 3:00pm-4:30pm

LOCATION SSB 238

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- | | | |
|------|---|--------|
| I. | Chair's Report – Jack Vevea
CRTE Periodic Review (p. 4) | 5 min |
| II. | Consent Calendar
A. Approval of the Agenda | |
| III. | BOARS Report (3/6/15 meeting) – Vice Chair Viney (p. 5) | 5 min |
| IV. | Update on the 3/17 General Education Meeting - GESC Chair Zanzucchi, VPDUE Whitt,
Interim VCSA Nies | 10 min |
| V. | Discussion: Core 1 60-Unit Cap – VPDUE Whitt | 15 min |
| VI. | Report from the CRF Subcommittee
<i>Members: Jack Vevea, Christopher Viney, Carrie Menke, Sholeh Quinn</i>
School of Engineering (pp. 6-24) | 10 min |
- 1) [BIOE 106: Cell Biology for Engineers](#)
 - 2) [ME 144: Introduction to Multi-body Dynamics](#)
 - 3) [CSE 135: Introduction to Theory of Computation](#)
- School of Natural Sciences (pp. 25-145)
- 1) [ESS 147: Astrobiology](#)
 - 2) [BIO 120L: General Microbiology Laboratory](#)
 - 3) [CHEM 008: Principles of Organic Chemistry](#)
 - 4) [MATH 146: Numerical Linear Algebra](#)
 - 5) [BIO 047: Astrobiology](#)
 - 6) [BIO 147: Astrobiology](#)
 - 7) [NSUS 010: Success in NatSci Preparatory](#)
 - 8) [NSED 130: Technology in Education](#)
 - 9) [NSUS 020: Success in NatSci Excellence](#)
 - 10) [BIO 174: Stable Isotope Ecology](#)
 - 11) [ESS 047: Astrobiology](#)
 - 12) [CHEM 008L: Principles of Organic Chemistry Lab](#)
 - 13) [CHEM 160: Introduction to Scientific Computing](#)
 - 14) [ESS 174: Stable Isotope Ecology](#)

This agenda may contain confidential and privileged material for the sole use of UGC Members.

- VII. [Revised SSHA Transfer Admission Criteria](#) (pp. 146- 149) 5 min
Associate Dean Ortez
 Proposal was discussed on March 3 and recommendations were sent to SSHA.
 School revised the proposal as suggested by UGC.
 Action requested: approval of revised Transfer Admission Criteria.
- VIII. [Review of the Catalog](#) (provided as hyperlinks only) 15 min
 Review Assignments:
 - o [SOE](#) – Carrie Menke (SNS); Paul Gibbons (SSHA); Christopher Viney (SOE)
 - o [SSHA](#) – Marcos Garcia-Ojeda (SNS); Sholeh Quinn (SSHA); Kelvin Lwin (SOE)
 - o [SNS](#) – Harish Bhat (SNS); Jack Vevea (SSHA); YangQuan Chen (SOE)
 Action requested: Review and approval of 15-16 Catalog
- IX. [Curriculum Revisions and Catalog](#) (pp. 150-151) – Registrar Herbrand 5 min
 Action: Consider flowchart for review of the Catalog proposed by the Registrar
- X. [SSHA Proposal for a Global Arts Studies Major](#) – Effective Fall 2016 (pp. 152-178) 10 min
 Comments are due to the Senate Chair by April 6. UGC is the lead reviewer.
 Action requested: Discuss proposal and send recommendation to the Senate Chair.
- XI. **Public Health CCGA Proposal**
 Public Health has submitted a proposal to establish a PhD program. If UGC chooses to opine, comments are due to the Senate Chair by April 9. Graduate Council is the lead reviewer.
 - [Proposal](#) (pp. 179-296)
 - Appendix – Faculty CVs (to be distributed)
- XII. **Systemwide Review Items** (Provided as hyperlinks only)
- A. [Systemwide Review of Proposed Revised Presidential Policy - Sexual Harassment and Sexual Violence](#)
<http://senate.universityofcalifornia.edu/underreview/documents/SystemwideReviewSexualHarassmentandSexualViolence.pdf>
 If UGC chooses to opine, comments are due to the Senate Chair no later than April 10, 2015
- B. [Proposed revisions to Senate Bylaw 128.D.2](#) (Vice Chairs)
<http://senate.universityofcalifornia.edu/underreview/documents/SystemwideReviewSBL128D2.pdf>
 These revisions are proposed by the University Committee on Rules and Jurisdiction and would provide that Vice Chairs for all standing systemwide committees whose memberships are governed by SBL 128 be at-large members. This change would affect UCAF, UCIE, UCOLASC, UCOPE, UCP&T, and UCACC; all six of these committees currently have Vice Chairs appointed from among Divisional representatives. UCR&J has reviewed the proposal and found it consistent with the Code of the Academic Senate.
 If UGC chooses to opine, comments are due to the Senate Chair no later than April 15, 2015

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- C. **Proposed Amendments to Senate Bylaw 182** (University Committee on International Education)

<http://senate.universityofcalifornia.edu/underreview/documents/ReviewofSB1823-15.pdf>

The proposed revisions expand the UCIE's purview from student exchange associated with UCEAP to international research collaborations, the welfare of international students and scholars, and international engagement initiatives.

If UGC chooses to opine, comments are due to the Senate Chair by May 5, 2015.

XIII. Executive Session – UGC Voting Members Only Please

10 min

TO: Center for Research in Teaching Excellence Stakeholders

FROM: Elizabeth Whitt, Dean of Undergraduate Education

RE: Notification regarding Confidential Email Account in Support of the Center for Research in Teaching Excellence Periodic Review

As you many know, the Center for Research in Teaching Excellence is undergoing periodic review, with a site visit by a [review team](#) to take place March 30, 2015. This process, which takes place once every seven years, affords a comprehensive review of the CRTE in support of long-term planning and continuous improvement.

Meetings with the review team have been scheduled for faculty, graduate students, and staff, and all stakeholders have been invited^[1] (see [schedule](#)).

We understand that not everyone who may wish to participate in the review is able. **As such, a confidential email account has been established to give all stakeholders the opportunity to comment to the external review team.**

The email account was established by a member of the Office of Institutional Assessment. Only this individual and the review team members have access to it. The emails are not viewed by any representative of the Center for Research in Teaching Excellence.

The account is established for the site visit only and will be closed and deleted immediately after the visit. Only comments made before or during the day of the team's visit (March 30, 2015) will be considered as part of the review process.

Please note that the review team will not respond to emails submitted to the account. However, the comments, along with other forms of information, will be considered as the team undertakes its work and develops its report, including recommendations to the Vice Provost and Dean of Undergraduate Education.

The team is not able to meet individually with members of the Center for Research in Teaching Excellence community, so please do not request private appointments.

To communicate to the review team, please address your email to: crtepr2015@yahoo.com

Please direct any questions you may have to Kerry Clifford, kclifford@ucmerced.edu.

Kerry Clifford
Program Review Manager
Office of Institutional Assessment
kclifford@ucmerced.edu/209-228-4099

^[1] If you did not receive an invitation and would like to participate a meeting please contact Kerry Clifford at kclifford@ucmerced.edu.

UNIVERSITY OF CALIFORNIA ACADEMIC SENATE
BOARD OF ADMISSIONS AND RELATIONS WITH SCHOOLS (BOARS)
Notice of Teleconference Meeting

Friday, March 6, 2015
10:00 a.m. – 1:00 p.m.

BOARS Website: <http://www.universityofcalifornia.edu/senate/committees/boars/>

AGENDA

- I. Consent Calendar**
 - BOARS draft minutes of February 6, 2015

- II. Announcements**
 - Ralph Aldredge, BOARS Chair
 - Henry Sanchez, BOARS Vice Chair

- III. Consultation with Academic Senate Leadership**
 - Mary Gilly, Academic Senate Chair
 - Dan Hare, Academic Senate Vice Chair

- IV. Consultation with UCOP – Office of Admissions**
 - Stephen Handel, Associate Vice President, Undergraduate Admissions
 - Michael Treviño, Director of Undergraduate Admissions
 - Monica Lin, Associate Director of Undergraduate Admissions
 - Adam Parker, Admissions Policy Coordinator

- V. Compare Favorably Reports**


- VI. International Application Evaluation**

- VII. Review of Natural Sciences Competency Statement**

❖ **This Agenda may contain confidential and privileged material for the sole use of the intended recipient. Any review or distribution by others is strictly prohibited.**

BIOE 106: Cell Biology for Engineers

Course Title	Cell Biology for Engineers
Abbreviated Course Title	Cell Biology for Engineers
Course Subject	BIOE
Course Number	106
School Submitting Request	Engineering
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	BIO 2 and (CHEM 10 or CHEM 10H) and (CHEM 8 or CHEM 8H) and BioE 30
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	This is an introductory course on cell biology from bioengineering perspective. The course materials focus on the fundamental concepts of modern cell biology and their biomedical and bioengineering applications. The course introduces fundamental principles of molecular cell biology and provides related biotechnology concepts.
TIE Code	T: Lecture
Reasons for Request	New Course
Brief Explanation of Change(s)	
Total Contact/Non-contact Hours Per Week	Lecture: 4 contact, 8 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	50
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	

Cross-listed Schools	----
Can this course be repeated?	No
How many times?	
Resource Requirements	classroom and TA
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 BIOE_106_materials.pdf (38Kb)

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SANTA CRUZ

SCHOOL OF ENGINEERING
UNIVERSITY OF CALIFORNIA, MERCED
5200 N. LAKE RD, MERCED, CALIFORNIA 95343
PHONE: (209) 228-4411 FAX: (209) 228-4047

Date: March 2, 2015

To: Undergraduate Council of the University of California, Merced

From: Shannon Adamson, Curriculum Planner
Corinne Townsend, Accreditation Analyst

The CRF and syllabus for BIOE 106 Cell Biology for Engineers were reviewed for compliance with WASC and ABET accreditation.

BIOE 106: Cell Biology for Engineers
Fall, 2016

Required Text: **Molecular Cell Biology (Lodish, Molecular Cell Biology)** by Harvey Lodish (Author), Arnold Berk (Author), Chris A. Kaiser (Author), Monty Krieger (Author), Matthew P. Scott (Author), Anthony Bretscher (Author), Hidde Ploegh (Author), Paul Matsudaira (Author)

Lecture Time and Location **TBD**

Professor **TBD**
Office Hours: TBA
Phone:
E-mail:

TA: **TBA**

Overview: This is an introductory course on cell biology from bioengineering perspective. The course materials focus on the fundamental concepts of modern cell biology and their biomedical and bioengineering applications. The course introduces fundamental principles of molecular cell biology and provides essential experimental information at the same time. The topics covered include cell chemical foundations, protein functions in the cell, basic molecular genetic mechanisms and techniques, cell membrane and organelles, cell signaling, extracellular matrix and cell community, cytoskeleton, cell cycle control and regulation, and cell fate and cancer. The course strives to provide clinical correlations and bioengineering applications of these concepts.

Course Objectives/Student Learning Outcomes: *By the end of this course, students will be able to:*

1. Students will be able to list the structures, properties and biological significance of the major classes of cellular organelles found in living organisms and the relationship between molecular structures and biological functions.
2. Students will be able to compare and contrast how researchers use basic knowledge of cellular processes to study cellular biology and the related biotechnology developments.
3. Students will be able to apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes.
5. Students will be able to categorize how evolution occurs at the level of the genes and genome and how alterations of cell function brought about by mutation.
6. Students will be able communicate information and their knowledge in cell biology.

Learning Outcomes will be assessed through quizzes, exams, project reports and classroom discussion.

Program Learning Outcomes

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design and conduct experiments, as well as to analyze and interpret data
7. an ability to communicate effectively
10. a knowledge of contemporary issues

Prerequisites by Topic: BIO 002 CHEM 10, CHEM 8 and BioE 30

Course Policies:

Grading

70% Exams (two midterm exams 20% each and one final exam 30%)

15% Projects

15% Homework & Quizzes

100 % Total


Academic Dishonesty Statement:

Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy.

Disability Statement: Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

ME 144: Introduction to Multi-body Dynamics

Course Title	Introduction to Multi-body Dynamics
Abbreviated Course Title	Intro to Multi-body Dynamics
Course Subject	ME
Course Number	144
School Submitting Request	Engineering
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	3
Prerequisites	ENGR 151 and Math 131
Prerequisites with a Concurrent Option	ME 140
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Rigid body mechanics (Rotation parameterization, Newton-Euler equations, inertia tensor), Interconnected bodies (joints, actuators, controllers), Equations of motion (Lagrange's equations, Lagrange multipliers, body jack, DAEs) and Analyses (kinematic, static, quasi-static, dynamic, kinetostatic, linear-dynamic). Background in vector mechanics, differential equations, numerical methods, linear algebra, MATLAB-Simulink, and Vibrations is recommended.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Unit Change
Brief Explanation of Change(s)	The discussion contact hour was not necessary and can be covered by office hours in future. So, this CRF requests elimination of the discussion. As a result, the units should reduce from 4 to 3.
Total Contact/Non-contact Hours Per Week	Lecture: 2 contact, 4 non-contact Lab: 3 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	9
Grading Options	Letter Grade Only
In Progress Grading	

Maximum Enrollment	30
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	ME 244: Introduction to Multi-body Dynamics
Cross-listed Schools	Engineering
Can this course be repeated?	No
How many times?	
Resource Requirements	TA per TA policy, MATLAB, Simulink, Budget for Commercial CAE software (Altair Hyperworks) with option of onsite training workshop, room with computers (and installed softwares) for lab sessions as requested by the instructor.
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 ME_144_materials.pdf (342Kb)

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PHONE: (209) 228-4411 FAX: (209) 228-4047

Date: March 2, 2015

To: Undergraduate Council of the University of California, Merced

From: Shannon Adamson, Curriculum Planner
Corinne Townsend, Accreditation Analyst

The CRF and syllabus for CS  35 Introduction to Theory of Computation were reviewed for compliance with WASC and ABET accreditation.

Introduction to Multi-body Dynamics

(Undergraduate Technical Elective ME 144 co-joined with lower division Graduate Course ME 244)

Tentative Draft Syllabus

1. Basic concepts in 3-D rigid-body mechanics
 1. Rigid body vs flexible body
 2. Spatial kinematics (3-D rotation transformations) and Euler theorem
 3. Newton-Euler equations of motion
 4. Moments and products of inertia
2. Inter-connected rigid bodies
 1. Kinematic pairs (joints) with classification of constraints
 2. Springs, dampers, actuators and controllers with brief introduction of controls theory
3. Formulation of equations of motion for inter-connected bodies
 1. Relative coordinates, generalized coordinates, Cartesian co-ordinates
 2. Lagrange' s equations
 3. Differential equations (ODE)
 4. Co-ordinate partitioning
 5. Types of analyses (kinematic, static, quasi-static, dynamic and linear dynamic)
4. **(Optional Extension)** Application of numerical methods
 1. NR method, Jacobian, ODE integrators (Euler methods and Implicit methods)

Besides the above syllabus, lectures will cover extra material pertaining to ME 244 that ME 144 students and strongly recommended to audit, but will not be evaluated for through assignments and quizzes.

Introduction to Multi-body Dynamics

(Undergraduate Technical Elective ME 144 co-joined with lower division Graduate Course)

Expected Learning Outcomes

This course will bring together students interested in the applied field of computational dynamics. They will extend their understanding of basic particle dynamics and 2-dimensional rigid body mechanics to 3-dimensional rigid bodies and how to analyze interconnected bodies in a multi-body system.

After completion of this course, the students will be able to:

1. Derive equations of motion for a rigid body in 3-dimensions.
2. Implement methods of formulating equations of motion for interconnected bodies.
3. Apply their mathematical background in differential equations, vector calculus, linear algebra and numerical methods to analyze multi-body systems.
4. Analyze the static and dynamic behaviors of the multi-body systems.
5. Extend their learning to application areas such as robotics and biomechanics.

Introduction to Multi-body Dynamics

(Undergraduate Technical Elective ME 144 co-joined with lower division Graduate Course)

Program Learning Outcomes

The following ME program learning outcomes will be met by this course:

1. An ability to apply knowledge of mathematics, science, and engineering
5. An ability to identify, formulate, and solve engineering problems
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

University of California Merced Graduate Course Request Form

Group Submitting Request

Mechanical Engineering and Applied Mathematics

1. Course Number

ME 244

Full Course Title:

Introduction to Multi-body Dynamics

Abbreviated Course Title:

Intro to Multi-body Dynamics

Effective Date

Fall 2013

Discontinue Date

Number of Units:

4

(Each unit should correspond to an average of 3 hours of student effort per week. For courses with nonstandard formats, justification for the number of units should be provided.)

2. Pre-requisites:

3. Are there co-requisites for the course?

No

If "yes" please list:

4. Is this course to be taken concurrently with another course?

No

If "yes" please list:

5. Is this course restricted to certain graduate groups?

No

If "yes" please list:

6. Course Description

Limited to 50 words

Rigid body mechanics (Rotation parameterization, Newton-Euler equations, inertia tensor), Interconnected bodies (joints, actuators, controllers), Equations of motion (Lagrange's equations, Lagrange multipliers, body jack, DAEs) and Analyses (kinematic, static, quasi-static, dynamic, kinetostatic, linear-dynamic). Background in vector mechanics, differential equations, numerical methods, linear algebra, MATLAB-Simulink, and Vibrations is necessary.

7. Reason for request

New Course: X

Suggested #:

Attach brief course outline

Course Modification (check all that apply)

Hours per week:

Grading Options:

New Course Number :

Lecture: 2

Grad Student Grading Letter grade Only

New Title :

Seminar:

New Description :

Discussion: 2

Unit Change :

Lab:

Pre Req Change :

Tutorial:

Grading Option Change :

Field: In Progress Grading

Replaces Course # :

Studio:

Discontinuance :

Brief explanation of change(s):

Is this course cross listed with another course?

No

If so, please list that course:

Maximum course enrollment: 40

Explanation:

To facilitate one-on-one discussion.

Is this course to be co-listed with an undergraduate course?

Yes

If so, please list that course and provide justification in cover letter:

ME 144 Intro to Multi-body Dynamics

9. May this course be repeated for credit?

No

If so how many times?

10. List the expected resource requirements, including personnel (TA's, etc.) library, classroom and lab space, supplies and equipment, IT requirements and transportation.

MATLAB, Simulink, Budget for Commercial CAE software (Altair Hyperworks) with option of onsite training workshop, room with computers for discussion sessions if requested by the instructor.

Course submitted by: Sachin Goyal 27 Apr, 2013
 Instructor proposing course Date

Approved by: [Signature] 5/1/13
 School Dean Date

Introduction to Multi-body Dynamics

(Undergraduate Technical Elective ME 144 co-joined with lower division Graduate Course ME 244)


Tentative Draft Syllabus

Everything in the syllabus below will be shared between ME 144 and ME 244 *except the parts highlighted in red font*. The parts highlighted in the red font are for audit in ME 144 (the undergraduate students will **not** be evaluated for their performance on them towards their final grade via assignments and quizzes). However, they belong to the performance evaluation criteria of the graduate students towards their final grade.

1. Basic concepts in 3-D rigid-body mechanics
 1. Rigid body vs flexible body
 2. Spatial kinematics (3-D rotation transformations)
 3. Euler theorem, **rotation parameterization, Rodriguez formula**
 4. Newton-Euler equations of motion
 5. Moments and products of inertia
2. Inter-connected rigid bodies
 1. Kinematic pairs (joints) with classification of constraints
 2. Springs, dampers, actuators and controllers with brief introduction of controls theory
3. Formulation of equations of motion for inter-connected bodies
 1. Relative coordinates, generalized coordinates, Cartesian co-ordinates
 2. Lagrange's equations **and other approaches such as body-jack method**
 3. Differential equations (ODE) and **differential algebraic equations (DAE)**
 4. Co-ordinate partitioning and **Lagrange multipliers**
 5. Types of analyses (kinematic, static, quasi-static, **kineto-static**, dynamic and linear dynamic)
4. **(Optional Extension)** Application of numerical methods
 1. NR method, Jacobian, ODE integrators (Euler methods and Implicit methods)
 2. **Stability, accuracy and Dahlquist's tradeoff criteria**
 3. **DAE integrators such as half-explicit methods**
 4. **Stiffness and damping - physical vs numerical**
 5. **Lock-up, bifurcation and singularities**

CSE 135: Introduction to Theory of Computation

Course Title	Introduction to Theory of Computation
Abbreviated Course Title	Intro to Theory of Computation
Course Subject	CSE
Course Number	135
School Submitting Request	Engineering
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	CSE 115 or ENGR 160
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Understanding the inherent capabilities and limitations of computers is a fundamental question in computer science. To answer this question, we will define formal mathematical models of computation, and study their relationships with formal languages. Topics will consist of three central areas of the theory of computation: automata, computability, and complexity.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Other
Brief Explanation of Change(s)	One hour discussion was replaced with three hours lab. In the teaching evaluation, some students said that one hour weekly discussion section was not enough to help them understand the course materials.
Total Contact/Non-contact Hours Per Week	Lecture: 3 contact, 6 non-contact Lab: 3 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	60
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	

Cross-listed Schools	----
Can this course be repeated?	No
How many times?	
Resource Requirements	TA per TA policy
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 ToC_CRF_ver4_CSE_135_F15.pdf (48Kb)

CSE135: Introduction to Theory of Computation

Description

Understanding the inherent capabilities and limitations of computers is a fundamental question in computer science. To answer this question, we will define formal mathematical models of computation, and study their relationships with formal languages. Topics will consist of three central areas of the theory of computation: automata, computability, and complexity.

Course Objectives/Student Learning Outcomes

Students Learning Outcomes. Students will learn several formal mathematical models of computation along with their relationships with formal languages. In particular, they will learn regular languages and context free languages which are crucial to understand how compilers and programming languages are built. Also students will learn that not all problems are solvable by computers, and some problems do not admit efficient algorithms. Throughout this course, students will strengthen their rigorous mathematical reasoning skills.

At the end of this course, students will be able to do the following:

- Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages.
- Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.
- Students will learn that certain problems do not admit efficient algorithms, and identify such problems.

Program Learning Outcomes. At the end of the course, students:

- will apply knowledge of computing and mathematics appropriate to the discipline.
- will function effectively as a member of a team in order to accomplish a common goal.
- will apply mathematical foundations, algorithmic principles and computer science theory to the modeling and design of computer based systems in a way that demonstrates
- will apply design and development principles in the construction of software systems of varying complexity.

Topics

- Automata and Language: We will study simple computing models which play a crucial role in compilers and programming languages.
 - Finite automata, regular languages, and regular grammars.
 - Context free grammars, languages, and pushdown automata.
 - Deterministic and nondeterministic automata.

- Computability Theory: We will define more powerful computing models to capture general computers, and learn that not all problems are solvable by computers.
 - Turing machines, Church's thesis, and undecidable problems.
- Complexity Theory: This theory aims to distinguish decidable problems in terms of time and space complexity.
 - Time complexity classes P and NP.
 - Reduction and NP-completeness.
 - Space complexity.

A tentative week-by-week schedule is as follows.

- Week 1. Course overview and deterministic finite automata (DFA).
- Week 2. Nondeterministic finite automata (NFA).
- Week 3. Equivalence of DFA and NFA, and regular expressions.
- Week 4. Regular expression and regular languages.
- Week 5. Non-regular languages and pumping Lemma, and closure properties.
- Week 6. Optimal DFA and review.
- Week 7. Midterm 1 and context-free languages.
- Week 8. Pushdown automata and grammar simplification.
- Week 9. Chomsky normal form and pumping lemma for context-free languages.
- Week 10. Closure properties and Membership Test
- Week 11. Review and Midterm 2.
- Week 12. Turing Machines and reduction.
- Week 13. NP-completeness.
- Week 14. Decidability and recognizability.
- Week 15. More complexities and approximability.
- Week 16. Review and final exam.

Prerequisites

- CSE115: Discrete Mathematics, or ENGR 160

Textbooks

No textbook is required, but the following book will be an excellent reference.

- Introduction to the Theory of Computation by Michel Sipser, 2nd Ed., Cengage Learning, 2005.

Academic Integrity

Academic integrity policy. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. Students are encouraged to study together and to discuss information and concepts covered in lectures. Students can provide/receive "consulting" to/from other students. However, the permissible cooperation should never involve one student having possession of a copy of all or part of the work done by someone else, in the form of an email, an email attachment file, a storage device, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will receive zero credit for the corresponding assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. During examinations, each student has to do only their own work. Talking or discussing is not permitted, nor students comparing their papers, copying from others, or collaborating in any way. Any collaborative behavior during examinations will result in failure of the exam and may lead to failure of the course and University disciplinary action.

Disability service information

Accommodations for students with disabilities: The University of California, Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design diversity. I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with the Disability Services Center to verify their eligibility for appropriate accommodations.

Grading

- Attendance 5%, first midterm 25%, second midterm 20%, final 30%, and homework 20%.


Instructor

Sungjin Im

- Office: Science and Engineering 2, # 214
- Email: sim3@ucmerced.edu
- Web: <http://faculty.ucmerced.edu/sim3>

ESS 147: Astrobiology

Course Title	Astrobiology
Abbreviated Course Title	Astrobiology
Course Subject	ESS
Course Number	147
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	Fall 2015
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	CORE 1 plus any of the following: BIS 1, BIS 5, PHYS 6, PHYS 8, CHEM 2, or ESS 1, or consent of instructor
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	The study of the origin and evolution of life in the cosmos includes areas of biology, astronomy, geology, chemistry & physics. We will cover three main themes: how did life begin and evolve? does life exist elsewhere in the universe? and what is life's future on Earth and beyond?
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Discontinuance ESS 047 replaces current upper level Astrobiology BIO-147 and ESS-147. ESS 047 as a lower level course will fulfill a GE science requirement for SSHA students, and an elective lower division science course for SNS and SOE students.
Brief Explanation of Change(s)	Lecture: 3 contact, 6 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 1 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Contact/Non-contact Hours Per Week	12
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	100
Maximum Enrollment Reason	----
Cross-listing	BIO 147
Conjoined	

Cross-listed Schools	----
Can this course be repeated?	No
How many times?	
Resource Requirements	TA at appropriate percent time to lead discussion section. LCD projector.
Does this satisfy a General Education Requirement?	Yes
Course Outline and/or Additional Documentation	 BIS ESS 147 Breugel Van Wil Spring 2008.pdf (43Kb)

Astrobiology BIS 147/ESS 147 – Spring 2008

Tuesdays-Thursdays 1:30-2:50 pm, COB 267

Discussion: Fridays 12:00-12:50 pm, COB 264

4 units (3 hours of lecture and 1 hour discussion)

Instructors: Dr. Wil van Breugel (office hours: 12:00-1:30 pm, COB 226), Dr. Mónica Medina (office hours: Mondays 3:00-5:00 pm, SE 314)

Teaching Assistant: Michael DeSalvo (office hours: TBD)

Course description: Astrobiology refers to the study of understanding the origin and evolution of life in the cosmos. It is an integrative, multidisciplinary field that includes areas of biology, astronomy, geology, chemistry and physics. Students will be confronted with some of the most fundamental topics addressed by science today such as who we are, where we came from, and where we might go. We will cover three main themes: how did life begin and evolve? does life exist elsewhere in the universe? and what is life's future on Earth and beyond?

Textbook: "Astrobiology: A Brief Introduction" K.W. Plaxco & M. Gross. 2006. Johns Hopkins University Press. ISBN 0-8018-8366-0

Grading: Your learning will be assessed as follows:

15%	midterm1
15%	midterm 2
15%	midterm 3
10 %	discussion
20%	student presentation and report
25%	final exam

Midterms: You will be given three midterms. The midterms will be in class exams. No make-up exams will be given unless there are exceptional circumstances justified by the appropriate documentation. Students who have a documented reason (such as a religious observance or scheduling conflict with another exam) may request to take the midterm exam *at a different time* the scheduled exam time.

Exam regrading: Midterm exams may be submitted for regrading if the student believes that errors were made in the grading. Requests for regrading must be made within a week of the exam being returned. Exams submitted for regrading will be completely regraded, so that the resulting grade may be higher or lower than the original grade. All mid-term exams will be photocopied after the initial grading. If a comparison of the photocopy and the exam submitted for regrading indicates any alteration, the case will be forwarded to the Office of Judicial Affairs. The final manuscript will be graded as a peer reviewed publication and will be available to students of the following semester.

Student presentation/report: You will be expected to work in groups and choose a topic of relevance to astrobiological research. It can come from topics discussed in class but your presentation should go into more depth and provide new insight from the most recent literature in *peer reviewed journals*. You are welcome to discuss your topic of choice with your instructors

and T.A. Your presentation will be 15 minutes long. Your report has to be at least 3,000 words, excluding figure legends and references.

Academic integrity: Academic honesty is a core value of the University of California and the central rule of academic honesty is that you must do your own work. While it is acceptable to work in groups to study, it is completely unacceptable to receive assistance of any kind on exams. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* and is available via UCMCROPS site. For additional information visit (<http://studentlife.ucmerced.edu/>). Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct that you witness.
- Know the rules -- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Darwin Day: Professor Antonio Lazcano. UNAM. “The Origin of Life on Earth: An Evolutionary Perspective”. Friday Feb 15, 3-5 pm COB 105 + COB 102 (overflow)

Other reference books:

“Life in the Universe: From the Miller Experiment to the Search for Life on other Worlds” Ed. by J. Seckbach, J. Chela-Flores, T. Owen & F. Raulin. 2004. Kluwer Academic Publishers. ISBN 1-4020-3093-2.

“Astrobiology: The Quest for the Conditions of Life” Ed. by G. Hornbeck & C. Baumstark-Khan 2001. Springer-Verlag. ISBN 3-540-42101-7

“Complete Course in Astrobiology” Ed. by G. Horneck & P. Rettberg, 2007. Wiley-VCH. ISBN 978-3-527-4-660-9.

“Life in the Universe” J. Bennett & S. Shostak, 2007. Pearson Education Inc. ISBN 0-8053-4753-4.

“Astrobiology: A Multidisciplinary Approach” J.I. Lunine. 2005. Pearson Education Inc. ISBN 0-8083-8042-6.

“Biological thermodynamics”. 2001. Donald T. Haynie. Cambridge University Press. ISBN 0-521-79549-4.

“Planets and Life: The emerging science of astrobiology”. 2007. Ed. Woodruff Sullivan & John Baross. Cambridge University Press. ISBN 978-0-521-82421-7.

Schedule

Lecture	Date	Concepts	Instructor	Reading
1	T, Jan 22	What is astrobiology	WVB, MM	Chapter 1
2	Th, Jan 24	Historical background and definitions	MM	
3	T, Jan 29	Cosmic foundations	WVB	Chapter 2
4	Th, Jan 31	Planet formation and early Earth	WVB	Chapter 3
5	T, Feb 5	Physics of chemistry	WVB	WVB
6	Th, Feb 7	Midterm review	WVB	
7	T, Feb 12	Midterm		
8	Th, Feb 14	Primordial soup	MM	Chapter 4
9	T, Feb 19	Sparks of Life	MM	Chapter 5
10	Th, Feb 21	Bio-thermodynamics I	WVB	Haynie
11	T, Feb 26	Bio-thermodynamics II	WVB	Haynie
12	Th, Feb 28	Molecules to Cells	MM	
13	T, Mar 4	Diversification of life I	MM	Chapter 7
14	Th, Mar 6	Diversification of life II	MM	
15	T, Mar 11	Midterm review	MM	
16	Th, Mar 13	Midterm		
17	T, Mar 18	Extremophiles on Earth	MM	Chapter 8
18	Th, Mar 20	Planetary evolution	WVB	
	Mar 24-28	Spring break		
19	T, Apr 1	Life on Mars?	WVB	Chapter 9
20	ThApr 3	Significance of Europa and Titan	MM	
21	T, April 8	Snowball Earth and the Cambrian Explosion	MM	
22	Th, Apr 10	Evolution of intelligence	MM	
23	T, April 15	Planetary protection	MM	
24	Th, April 17	Midterm review	MM	
25	T, Apr 22	Midterm		
26	Th, Apr 24	Life elsewhere	WVB	Chapter 10
27	T, Apr 29	Extrasolar planetary systems and life	WVB	
28	Th, May 1	Student presentations		
29	T, May 6	Student presentations		
30	Th, May 8	Student presentations		
31	T, May 13	Final review	WVB, MM	
	TBD	Final Exam		

BIO 120L: General Microbiology Laboratory

Course Title	General Microbiology Laboratory
Abbreviated Course Title	General Micro Lab
Course Subject	BIO
Course Number	120L
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	3
Prerequisites	Bio110
Prerequisites with a Concurrent Option	Bio120
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Laboratory experiments demonstrating and reinforcing concepts covered in Bio120.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Unit Change Grading Option Change Other
Brief Explanation of Change(s)	To effectively teach a microbiology lab course, the students should have at least 2 different laboratory meetings per week, of at least 3 hours each. Currently, the lab sections are set for 2 hours, and this is not enough time for the students to perform the duties expected of them. Two 3-hour sections will allow for the set-up of experiments on one section, followed by the analysis of the experiments 48h later, a standard bacterial growth time. An hour lecture to explain the laboratory procedures is also needed. Therefore, the units should be increased to 3 for having 6 hours of lab and 1 hour of lecture. Changed grading option to letter grade only.
Total Contact/Non-contact Hours Per Week	Lecture: 1 contact, 2 non-contact Lab: 6 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact

Total Hours Per Week	Studio: 0 contact, 0 non-contact 9
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	60
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	
Cross-listed Schools	----
Can this course be repeated?	No
How many times?	

Resource Requirements

Teaching Assistants to lead laboratory sections and grade assignments. One TA per 20 students. IT Support will be needed in setting up and maintaining a course CROPS Portal. IT Support will be needed in making some interactive course materials available on the WWW. Classroom for lecture and wet lab space are needed. Supplies needed.

Does this satisfy a General Education Requirement? No

Course Outline and/or Additional Documentation

 [Bio120L_SyllabusF14.pdf \(323Kb\)](#)

BIO120L: General Microbiology Lab FALL 2014

Instructor: Prof. Marcos E. García-Ojeda mgarcia-ojeda@ucmerced.edu
Office Hours: **TBD**, SE 326, or by appointment.

Teaching Assistant: Jason Kilian jkilian@ucmerced.edu
Office Hours: **TBD**.

Teaching Assistant: Lauren Edwards ledwards3@ucmerced.edu
Office Hours: **TBD**.

Laboratory Coordinator: James Whalen, Ph.D. jwhalen@ucmerced.edu

Lectures:	Section 1: F	1:30-2:20 am	Room COB 113.
Laboratory:	Section 2: MW	2:30-4:20 pm	Room SE 155.
	Section 3: MW	5:30-7:20 pm	Room SE 155.

Course Overview: This course involves laboratory experiments demonstrating and reinforcing topics covered in BIO 120. Topics explored include microbiological techniques, microscopy, microbial growth, structures and motility, microbial metabolism and biochemistry, molecular biology of microbes, microbial development and microbial relationships. The material is covered in a weekly formal lecture, and two laboratory sections.

Course Learning Objectives: In addition to the course objectives encompassed in BIO120, this laboratory class will allow our student to:

- 1) utilize microbiological laboratory techniques to isolate, identify and characterize microorganisms,
- 2) discern the molecular, metabolic and structural differences between microbial cells and how these differences allow scientist to utilize microbes as tools for science, medicine, and industry, and
- 3) gain the laboratory experience to perform laboratory research and maintain a laboratory notebook following Good Laboratory Practice techniques.
- 4) work with numerical data, including the calculation of bacterial doubling times, generations and growth rates, as well as dilution factors.
- 5) exercise procedures to ensure safety in the laboratory.

Reaching us: E-mail is the best way to reach us. Please reserve e-mail for administrative questions (such as making an appointment with the instructors). ***Do not use e-mail for questions on the course material – e-mail is very inefficient for that purpose. Please use office hours, discussion sections, the UCMCROPS chat room and study groups for specific questions on the lecture material.***

Course Requirements: To enroll in BIO 120L, the student must have previously taken or be concurrently enrolled in BIO 120. BIO 120L is strongly recommended for all Biological Science majors following the Microbiology and Immunology emphasis track. The lab is not required for other Biological Science tracks unless BIO 120 is to be used as a core course.

Textbook: "Brock Biology of Microorganism" by Madigan et al., 13th Edition (required). This book provides a broad overview of all the topics covered in BIO120. Reading and study questions will be assigned from this textbook.

Lab Material:

1. BIO120L Lab Manual - can be obtained from UCMCROPS as a pdf file.
2. Lab supplies - sharpie pen and lab notebook.

Supplementary Reading: Will be provided; check UCMCROPS for details.

Clickers. Clickers will be used during lecture to review material, assess students understanding, take attendance and give quizzes. Please follow the directions online to register your clicker for class.

<http://it.ucmerced.edu/get-help/service-centers/classroom-media-support-services/classroom-technology-support/clickersforstudent>

Website: We will make extensive use of the UCMCROPS site for BIO120L. Lecture slides, reading material, and announcements will be provided via the CROPS site (students are responsible for printing materials as necessary). If you have trouble accessing the CROPS site, you should notify IT as soon as possible.

Attendance: Attendance to all labs and lab lectures is required to pass the course. Material for exams will come from both the lectures and the labs, and quizzes and exams will be given in lab lecture. It is helpful if you have read the chapter on the lecture material and looked at the lecture handouts before lecture. Come to each lab lecture and laboratory prepared; students will be graded based on active participation. If you are anticipating an absence for an excusable reason, you must obtain approval in advance from Dr. García-Ojeda or your TA, or there must be a serious, mitigating circumstance after the fact, also subject to approval.

Failure to adhere to the required attendance policy will result in either a failing grade and/or a student being dropped from the course.

Laboratory: The laboratory section allows you to perform the experimental portion of this class. Students are expected to be prepared for lab section. **As with the lab lecture, attendance to labs is required.** The format, content and organization of lab sections are covered in the lab manual.

Grading: The final grade for BIO 120L will be calculated as follows:

Assessment	Points:	Percentage:
Midterm Exam	150	18.75%
Final Exam	150	18.75%
Quizzes (10 points each, best 5 of 6)	50	6.25%
Lab Effort, Conduct and Participation	50	6.25%
Lab Notebooks (~20 points each check, 6 checks)	120	15.00%
Lab 0 Report	50	6.25%
Lab 4-5 Homework	30	3.75%
Virtual Ames Test	25	3.125%
<i>Pseudomonas</i> Isolate and Unknown Report	150	18.75%
BLAST Homework	25	3.125%
Total	800	100%

EXPLANATION OF GRADE COMPONENTS:

The final distribution of grades in BIO120L will depend on the overall achievement of the students in the course, but the following grades will be *guaranteed* to students achieving the indicated percentage of the total possible points in the course.

A 90 - 100	B+ 85 – 87.9	C+ 75 – 77.9	D+ 65 – 67.9
A- 88 – 89.9	B 80 – 84.9	C 70 – 74.9	D 60 – 64.9
	B- 78 – 79.9	C- 68 – 69.9	F 0 – 59.9

Information on grade appeals, incompletes, et cetera can be found in the *UC Merced Grading Policy* available from the Registrar.

Exams: There will be two practical exams given during the course (a midterm on 10/13/14 and a final on 12/8/14). Due to the preparation required for putting together practical exams, **make-up exams cannot be given for any missed exams**. Students need to bring a **non-graphing, non-programmable calculator** for use on all exams. Students must also bring a photo ID to each exam.

All answers on exams must be written in **INK**. Whiteout may **not** be used. Regrades must be submitted with a letter of explanation to Dr. García-Ojeda by a specified date (usually 3-5 days after the graded tests are returned). Any exam written in pencil or erasable ink will not be regraded. Exams are copied before they are returned to students. Any student found altering an exam to obtain extra points will be immediately reported to the Dean of Students. Regrades are not permitted for the final exam.

As mentioned previously, there are no "make-up" exams. Any missed midterm exam must receive approval by Dr. García-Ojeda or your TA before any anticipated absence, or there must be a serious, documented circumstance after the fact, also subject to approval. In all cases, you must be able to provide evidence to establish the basis of any request. If approved, it will be at the sole discretion of the course instructors as to whether a student will be allowed to prorate points for the missed exam, or merely to lose those points. The final exam cannot be missed.

Quizzes: At least 6 quizzes will be given during the lab lectures. These may be announced or unannounced/pop quizzes. Quizzes will usually be given during the first few minutes of lab lecture; there will be no make-ups or extra time allowed if you are not present to take the quiz.

Homework and Reports: The homework assignments and lab reports are due during the first 15 minutes of the lab or lab lecture period. Any report received after that time on the due date will receive a maximum of 75% credit. A maximum of only 50% credit will be given reports that are one day late. No credit will be given for reports that are more than one day late. NO exceptions! Unforeseen problems sometimes do occur, so PLAN AHEAD and complete the assignments early.

Lab Effort, Participation, and Conduct Evaluation: The instructors will evaluate each student based on a number of criteria including preparation for lab, effort made during conduct of experiments, demonstrated mastery of lab technique, organization, adherence to lab policies (which includes following lab safety procedures), professional behavior during lab (which includes being respectful of Instructors, TAs, and fellow students), and participation during pre-lab TA presentations and discussions. In addition, points will be deducted for poor laboratory conduct at the discretion of the instructor and TA for any of the following: breaking or abusing equipment, not cleaning up properly,

failure to use equipment log sheets, consistently arriving to or leaving lab late, unexcused lab absences, unwillingness to work with group members on a consistent basis, etc.

Lab Notebook: Students are required to maintain a lab notebook for transcribing detailed observations, procedures, results, data analysis, answers to questions at end of experimental sections in lab manual, and other interesting insights. The lab notebook is a record of the experiments performed in this class – any and every detail of an experiment should be included (even **errors** you may make!).

A good notebook is one that could be used by another student to reproduce the experiments performed. It is advisable to **use ballpoint pens** when writing in your lab notebook, in case spills occur during labs, as other types of pens, and even pencils may smudge when wet. Notebooks should be **legible**, as they are the permanent record of your activities in lab, and they will be graded! However, they need not be tidy or neat so long as all the important information is there. If written errors are made, cross them out, and write the correction nearby. No erasers, or whiteout are permitted. Recopying of information from another sheet of paper into your lab notebook is **NOT** acceptable. Photocopying pages from any other notebook for inclusion into the lab notebook is **NOT** acceptable.

Notebooks will be turned in at the end of the semester for grading. Notebooks will also be collected and checked periodically throughout the semester at the discretion of the instructor or TA, so **bring your notebook to every lab!**

What kind of notebook do you need? A permanently bound notebook (such as those sold for laboratory notebooks in the student bookstore) is required. You do NOT need to spend a lot of money on this notebook. If your notebook has pre-numbered pages, great; if not, you will have to number the pages.

Disabled Student Services: UC Merced is committed to make our courses accessible to all students, including students with limited mobility, impaired hearing or vision, and learning disabilities. Students with special needs should contact Disability Services (disabilityservices@ucmerced.edu) as soon as possible so that arrangements can be made. Their website is <http://disability.ucmerced.edu/>.

Cheating or Plagiarizing: We simply will not tolerate it. We will follow the *UCM Academic Integrity Policy*, which is posted on <http://studentlife.ucmerced.edu/what-we-do/student-judicial-affairs/academicy-honesty-policy>. Familiarize yourself with this document. **Know the rules -- ignorance is no defense!** Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

	Monday	Wednesday
WEEK 1 08/25/14	No School	No School
WEEK 2 09/01/14	Labor Day Holiday	1. Check in and introductions. 2. Intro to CX41 Microscopes – “e” slides, Wet Mounts, Pond Water
WEEK 3 09/08/14	1. Exp. 0 -(Period 1) Media calculations 2. Exp. 0 -(Period 2) Make media, pour plates, streak plate of mixed culture	1. Exp. 0 -(Period 3) Examine Streak Plates, restreak 2. Calibration of micrometer 3. Review Microscope techniques
WEEK 4 09/15/14	1. Exp. 0 -(Period 4) Prepare smear from mixed culture streak plates for Gram Stain 2. Exp. 1 - (Period 1) Inoculate plates.	1. Exp. 0 - (Period 5) Finish Gram stains from streak plates. 2. Exp. 1 - (Period 2) Examine blood agar and SYTA plates, streak GYC plate.
WEEK 5 09/22/14	1. Exp. 0- Lab Report due (at the beginning of lab) 2. Exp. 1 - (Period 3) Examine GYC plates, Gram stains. 3. Exp. 2 - (Period 1) Cell morphology with brightfield microscopy	1. Exp. 1 - (Period 4) Examine air, soil and water plates, Gram stains. 2. Exp. 2 - (Period 2) Wet mounts and phase-contrast microscopy 3. Exp. 3A - (Period 1) Inoculate first enrichment culture. (Bring soil sample)
WEEK 6 09/29/14	1. Exp. 3A - (Period 2) Wet mount, inoculate second enrichment. 2. Exp. 4 (Period 1) Serial dilutions, spread plate. 3. Microscope catch-up	1. Exp. 3A - (Period 3) Wet mount, streak first plate. 2. Exp. 4 (Period 2) Plate counts. 3. Exp. 5 (p 60) Growth curves
WEEK 7 10/06/14	1. Exp. 3A - (Period 4) <i>Pseudomonas</i> Unknowns – Wet mount, Gram stain, streak YTA plates of Isolates and Unknown.	1. Exp. 4/5 Homework due (at the beginning of lab) 2. Exp. 3A (Period 5) Wet mount, Gram stain, streak YTA, O/F, Oxidase tests.
WEEK 8 10/13/14	Midterm Exam Lab notebooks due	1. Exp. 3A (Period 6) Stock slants of Isolate and <i>Pseudomonas</i> Unknown, size determination. 2. Exp. 3B (Period 1) Inoculate master plates and tubes
WEEK 9 10/20/14	1. Exp. 3B (Period 2) Inoculate temperature and biochemical tests, replicate plates.	1. Exp. 3B (Period 3) – Read results of biochemical tests and examine cultures for growth at different temperatures. 2. Exp. 6 (Period 1) Plate auxotroph:prototroph mixture.
WEEK 10 10/27/14	1. Exp. 8 (Period 1) β -galactosidase exp.	1. Exp. 6 (Period 2) Pick auxotrophs and verify. 2. Exp. 7 (Period 1) <i>E. coli</i> transformation.

BIO120L_LAB SCHEDULE 2014.xlsx

	Monday	Wednesday
WEEK 11 11/03/14	1. Exp. 3C (Period 1) Streak YTA plates with <i>Pseudomonas</i> Isolate & Unknown. 2. Exp. 6 (Period 3) Inoculate YTB. 3. Exp. 7 (Period 2) View bioluminescent colonies.	1. Exp. 3B - (Period 4) Repeat tests as needed. 2. Exp. 3C - (Period 2) Perform PCR on presumed <i>Pseudomonas</i> Isolate & Unknown. 3. Exp. 6 - (Period 4) Test auxotrophic requirements.
WEEK 12 11/10/14	1. Exp. 3C (Period 3) Electrophoresis of PCR samples. 2. Exp. 3D (Period 1) Submit PCR samples for DNA sequencing. 3. Exp. 6 (Period 5) Read results and inoculate YTB.	1. Exp. 3A-3B – Pseudomonas Isolate & Unknown Report due at beginning of lab! 2. Exp. 6 - (Period 6) Test auxotrophic requirements. 3. Exp. 9 - (Period 1) Mutagenicity assay.
WEEK 13 11/17/14	1. Exp. 6 - (Period 7) Read results. 2. Exp. 9 - (Period 2) Read results. Virtual Ames mutagenicity experiment.	1. Exp. 9 - Virtual Ames Test Homework due at beginning of lab 2. Exp. 10 - (Period 1) Test transmissible drug resistance.
WEEK 14 11/24/14	1. Exp. 3D - (Period 2) BLAST of <i>Pseudomonas</i> Isolate & Unknown. 2. Exp. 10 - (Period 2) Read results	Thanksgiving Holiday
WEEK 15 12/01/14	1. BLAST Homework due at beginning of Lab! 2. Exp. 3D – Pseudomonas Isolate & Unknown	
WEEK 16 12/08/14	Final Lab Exam – in Lab. Turn in Lab Notebooks at Exam.	
WEEK 17 12/15/14	No lab	

CHEM 008: Principles of Organic Chemistry

Course Title	Principles of Organic Chemistry
Abbreviated Course Title	Prin of Org Chem
Course Subject	CHEM
Course Number	008
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	
Prerequisites	Chemistry 10 with a grade of C- or better, OR Chemistry 2 with a grade of A- or better
Prerequisites with a Concurrent Option	CHEM 008L
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Molecular shapes and charge distributions; resonance; electron delocalization; organic structures, nomenclature and isomerism, stereochemistry; optical activity; organic reactions; IR spectroscopy; intermolecular forces. Rational approaches to organic mechanism are emphasized
TIE Code	T: Lecture
Reasons for Request	Replaces Course # Replace existing Chem 008 to separate out lab requirement. Students will need to take Chem 008L but will allow student to repeat Chem 008 lecture and maintain their existing grad in Chem 008L
Brief Explanation of Change(s)	Lecture: 3 contact, 6 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Contact/Non-contact Hours Per Week	
Total Hours Per Week	9
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	230
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	
Cross-listed Schools	----

Can this course be repeated? No

How many times?

Resource Requirements

Requires a large lecture hall with online resource support to deliver coursework

Does this satisfy a General Education Requirement? No

Course Outline and/or Additional Documentation  [SyllabusChem8 Spring 2014-JEH.pdf \(126Kb\)](#)

Chemistry 8

Principles of Organic Chemistry

Spring Semester, 2013

Instructor:

Prof. Jason Hein

Email: jhein2@ucmerced.edu

Phone: 683-4650

Office: S&E 364

Office Hours: At the Lantern

Mon 2:30 – 3:30

Tue 1:30 – 2:30

Lectures: Tuesday and Thursday, 12:00 – 1:20 in COB 102

Laboratory lectures: Monday 1:30 – 2:20 in COB 102

Laboratory times vary with section

Final exam: Thursday May 15 8:00 – 11:00 in COB 102

Lab Teaching Assistants:

Diana Yu

Ivy Price

Xiao Li

Al Tramontano

Thomas Giagou

Required Texts: P. Y. Bruice, Organic Chemistry, Prentice Hall, 7th ed.
Lab Text: Handouts

Also required: "clickers" for in-class quizzes and polling.

Recommended: P. Y. Bruice Study Guide and Solution's Manual
P-H molecular Models Kit
Red-blue 3D glasses (will be supplied)

Midterm Exams:

Exam 1: in class - 50 points Thursday Feb. 13

Exam 2: in class – 100 points Thursday Mar. 20

Exam 3: in class – 100 points Thursday Apr. 24

Final Exam: This is a cumulative exam. It will count 200 points.

Quizzes:

There may be unannounced quizzes. Any points from these will be added to your total.

Homework:

There is no formal homework; however, exam and quiz questions may be the same or similar to questions in the text and the in class quizzes. So, there is an incentive for students to do as many problems from each chapter as they have time. The study guide has the answers but if a student does not understand how an answer was obtained, they should come to Dr Hein’s office or see a tutor.

Lab Lecture:

Lab lecture time is scheduled for Monday at 1:30 pm. This time will be used to talk about the theory and practice to be completed in the lab section. Also, part of this time will be used as a study session to answer problems and work through question about lecture material. Clicker quizzes may be scheduled for this time also. ATTENDANCE IS HIGHLY RECOMMENDED

Labs: The TAs will assign points for labs and the total amount will be adjusted to account for 150 pts of the overall 600 pts.

Total points and grading:

Exams:	450 points
Labs:	150 points
Total:	600 points

Quiz points will be added to your total as a bonus and so will not change the denominator 600 points.

If you master the learning outcomes and get at least a certain number of points in the course, you are guaranteed at least the following grades:

- A: 540 points (90%)
- B: 480 points (80%)
- C: 420 points (70%)
- D: 360 points (60%)
- F: less than 360 points

The **American with Disabilities Act (ADA)** is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Center at (209) 228-6996 or Email: disabilityservices@ucmerced.edu

The Disability Services Center is located on the first floor of the Kolligian Library, West Wing, Room 113.

Academic Integrity

Academic Integrity is the cornerstone of academic achievement. The current policies for UC Merced are described in the “*UC Merced Interim Academic Honesty Policy and Adjudication Procedures*” and are available via the UCMCROPS site.

Collaboration during an Exam or Quiz is forbidden.

Course Learning Outcomes. By the end of this course, you will be able:

1. To use appropriate nomenclature, and identify the structure and bonding of common organic compounds.
2. To predict the reactivity and the product of the reaction of basic molecules such as alkenes and acids/bases; to explain the thermodynamic or kinetic basis for reactivity.
3. To identify stereochemical centers and to predict stereochemical outcomes of reactions, particularly Diels-Alder reactions.
4. To recognize reactive positions on organic compounds and to predict reaction products, particularly as applied to substitution, elimination, and reactions at alcohols and amines.
5. To determine if a compound has conjugated double bonds or is aromatic and to predict reaction products of substituted benzene reactions as well as heterocyclic compounds.
6. To design a successful synthetic pathway that would allow the production of organic compounds such as substituted benzene or stereochemically correct substitution products.

Goal of the Course/tips for success:

This course is designed to both teach introductory concepts in organic chemistry, and to prepare students for future organic chemistry courses. Therefore, many basic concepts such as nomenclature and stereochemistry are taught. However, it must be emphasized that Organic Chemistry is about understanding reactivity and predicting reaction outcomes based on chemical knowledge, NOT about just memorizing jargon. So although the jargon is essential for proper communication among chemists (and you will be examined on it), a much greater part of the course is solving problems that show understanding of chemical concepts.

Therefore, a successful Chem 8 student will prepare by reading the book, will attend lecture, ask questions, and do many practice problems. Simply memorizing facts will not get you far in understanding organic chemistry. If you need help, office hours and tutoring are available. The amount of material is large and the time needed to understand mechanism is considerable. The course continuously builds on what comes before. Do NOT fall behind.

TENTATIVE Class Schedule (Be aware that these may change)

Date	Topic	Chapter	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6
T 1/21	Introduction to course and syllabus; Electronic structure, bonding	1	X					
R 1/23	Electronic Structure, bonding	1	X					
M 1/27	Lab Lecture 1 (Quizzes start)	1	X					
T 1/28	Acids/Bases	1		X				
R 1/30	Acids/Bases	1		X				
M 2/3	Lab Lecture 2	1	X	X				
T 2/4	Nomenclature, cycloalkanes	2	X	X				
R 2/6	Nomenclature, cycloalkanes	2	X	X				
M 2/10	Lab Lecture 3	2	X	X				
T 2/11	Review	1-2	X	X				
R 2/13	Exam 1	1-2	Assess	Assess				
M 2/17	Lab Lecture 4							
T 2/18	Alkenes, Thermodynamics/Kinetics	3		X				
R 2/20	Alkenes, Thermodynamics/Kinetics	3		X				
M 2/24	Lab Lecture 5							
T 2/26	Alkene Reactions	4		X				
R 2/28	Alkene Reactions	4		X				
M 3/3	Lab Lecture 6							
T 3/4	Reaction Stereochemistry, Delocalization	5			X			
R 3/6	Reaction Stereochemistry	5			X			
M 3/10	Lab Lecture 7							
T 3/11	Delocalization, Diels-Alder Reaction	7		X	X			
R 3/13	Delocalization, Diels-Alder Reaction	7		X	X			
M 3/17	Lab Lecture 8							
T 3/18	Review	3-7			X			
R 3/20	Exam 2	3-7		Assess	Assess			
M 3/24	Spring Break – No Class	-	-	-	-	-	-	-
T 3/25	Spring Break – No Class	-	-	-	-	-	-	-
R 3/27	Spring Break – No Class	-	-	-	-	-	-	-
M 3/31	Lab Lecture 9							
T 4/1	Substitution Reactions	8				X		
R 4/3	Substitution Reactions	8				X		X
M 4/7	Lab Lecture 10							
T 4/8	Elimination Reactions	9				X		

R 4/10	Elimination Reactions (Lab Lecture 10)	9				X		
M 4/14	Lab Lecture 11							
T 4/15	Elimination Reactions	9				X		X
R 4/17	Alcohols, Amines, Organometallics,	10, 11					X	
M 4/21	Lab Lecture 12							
T 4/22	Alcohols, Amines, Organometallics, Aromaticity	10, 11					X	
R 4/24	Exam 3	8-11			Assess	Assess	Assess	Assess
M 4/28	Discussion section							
T 4/29	Benzene Reactions, Substituted Benzene Reactions	15,16					X	X
R 5/1	Benzene Reactions, Substituted Benzene Reactions	15,16					X	X
M 5/5	Discussion section							
T 5/6	Benzene Reactions, Substituted Benzene Reactions	15,16					X	X
R 5/8	Discussion section							
	Final Exam: Monday May 15, 8:00-11:00 COB 102		Assess	Assess	Assess	Assess	Assess	Assess

MATH 146: Numerical Linear Algebra

Course Title	Numerical Linear Algebra
Abbreviated Course Title	Numerical Linear Algebra
Course Subject	MATH
Course Number	146
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	4
Prerequisites	
Prerequisites with a Concurrent Option	Math 131, Math 141
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Matrix factorization and iterative methods for solving systems of linear equations. Topics include floating point arithmetic, eigenvalue problems, conditioning and stability, LU factorization, QR factorization, and SVD with applications in science and engineering.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Pre-requisite Change Other
Brief Explanation of Change(s)	We have changed Math 141 from a Prerequisite to a Prerequisite with a Concurrent Option. In addition, we have changed the Effective Term to Fall 2015 so that we may offer this course as soon as Fall Semester, 2015.
Total Contact/Non-contact Hours Per Week	Lecture: 3 contact, 3 non-contact Lab: 1 contact, 5 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	30
Maximum Enrollment Reason	----
Cross-listing	

Conjoined

Cross-listed Schools

Can this course be repeated?

No

How many times?

Resource Requirements

One lecture room with LCD projector (capacity 30), computer laboratory with computers that have the Matlab programming language installed, and a Teaching Assistant (25% time per section).

Does this satisfy a General Education Requirement?

No

Course Outline and/or Additional Documentation

 [Math146_Syllabus.pdf \(71Kb\)](#)

Math 146: Numerical Linear Algebra

4 Units

Sample Syllabus

Course description: Matrix factorization and iterative methods for solving systems of linear equations. Topics include floating point arithmetic, eigenvalue problems, conditioning and stability, LU factorization, QR factorization, SVD, and applications in science and engineering.

Learning objectives: *The objective of this course is to enable the student to solve large systems of linear equations using direct matrix factorization, iterative numerical methods, and computer software with the understanding and knowledge of the underlying mathematical concepts.*

Learning outcomes: By the end of this course, students will

1. Understand the theoretical basis for direct and iterative methods for solving linear systems of equations
2. Know how to choose appropriate numerical methods to solve a particular linear algebra problem
3. Be able to implement, test and validate codes to solve problems in linear algebra numerically
4. Understand the singular value decomposition and how to use it for data analysis

Relationship to Program Learning Outcomes: Math 146 primarily addresses three of the five Program Learning Outcomes of the Applied Mathematics major:

1. PLO #2: Solve mathematical problems using computational methods.
2. PLO #3: Recognize the relationships between different areas of mathematics and the connections between mathematics and other disciplines.
3. PLO #4: Give clear and organized written and verbal explanations of mathematical ideas to a variety of audiences.

Lecture: 3 hours per week

Instructor: Prof. Roummel Marcia

Email: rmarcia@ucmerced.edu

Office hours: M 10am-11:50am

Discussion section: (1 hour per week) Discussion sections will help review concepts introduced in lectures and more importantly, develop your programming skills, focusing on all of the Learning outcomes.

Main textbook: Lloyd Trefethen and David Bau, III, *Numerical Linear Algebra* (SIAM 1997), ISBN 978-0-89871-361-7.

Supplemental texts

- James W. Demmel, *Applied Numerical Linear Algebra* (SIAM 1997), ISBN 978-0-898713-89-3.

- Roger A. Horn and Charles R. Johnson, *Matrix Analysis, 2nd edition* (Cambridge University Press, 2013), ISBN 978-0-521-83940-2.
- Gene Golub and Charles Van Loan, *Matrix Computations, 3rd edition* (The Johns Hopkins University Press, 1996), ISBN 0-8018-5414-8.
- Lars Eldén, *Matrix Methods in Data Mining and Pattern Recognition* (SIAM 2007), ISBN 978-0-898716-26-9.

Course materials

- **Computer software:** MATLAB – Your homework assignments will require a significant amount of programming and data analysis. We recommend MATLAB (available in several of our computer labs) or free alternative to MATLAB such as OCTAVE. MATLAB can be found on computers in rooms COB 281, KL 202, and KL 208.
- **Course webpage:** The Math 140 website is part of the UCMCROPS course manage system.

Lecture and Readings

- Please read material before coming to class; some knowledge of the material will promote better class discussion and a better learning experience.
- Class participation is encouraged, and it may influence grades in borderline cases. Your class participation is greatly appreciated.
- Students are responsible for all information discussed in class; if you skip class, make sure you get any important information from others.
- All portable electronic devices (e.g., cell phones, pagers) must be turned off and put away during exams, lectures, and discussion sections. Calculators are the exception; they may be used in lectures and discussion sections, but **not** in exams. The use of laptops in lectures is generally prohibited, but permission from the instructor may be granted upon request.

Homework

Homework will focus on the Learning Outcomes and will be assigned nearly every week and will be due the following week. Solutions will be graded for correctness of content, clarity of technical writing and presentation. Show and adequately explain your work, explicitly writing all relevant steps and calculations. Writing that is difficult to read will **NOT** be graded. Late homework will be penalized at a rate of 25% penalty for each day late.

You are encouraged to work in groups. However, **you must be the sole author of all work turned in.** For each homework, you must identify explicitly all individuals with whom you worked. In addition, you must **list explicitly any outside sources employed, including websites.** This does not mean that you are allowed to copy a solution should you find it posted elsewhere.

Exams

There will be two unit exams and a comprehensive final. All exams will focus on the learning outcomes. To avoid disturbances over this short examination period, students will not be permitted to enter the room late or to leave early. *There will be no make-up exams or early exams.* If you are sick during a unit exam, please bring a note from your doctor verifying your illness. Your course grade will be determined by the rest of your course work.

Grading: A combination of the 11 homework assignments (40%, the worst homework grade will be dropped), two unit exams (each worth 15%), one cumulative final exam (25%), and class participation (5%).

Dropping the course

Please see the UC Merced *General Catalog* for more details.

Special accommodations


If you qualify for accommodations because of a disability, please submit a letter from Disability Services to the instructor in a timely manner so that your needs may be addressed. Student Affairs determines accommodations based on documented disabilities. I will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please speak with me during the first week of classes regarding any potential academic adjustments or accommodations that may arise due to religious beliefs during this term.

Academic integrity

Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the Academic Honesty Policy. Go to <http://studentlife.ucmerced.edu/> and look under “Student Judicial Affairs.”

BIO 047: Astrobiology

Course Title	Astrobiology
Abbreviated Course Title	Astrobiology
Course Subject	BIO
Course Number	047
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Astrobiology refers to the study of the origin and evolution of life in the cosmos: What is life, how did it form, and where is it? It is an integrative, multidisciplinary field that includes areas of astronomy, biology, (bio)chemistry, geology, and physics.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course
Brief Explanation of Change(s)	This replaces current upper level Astrobiology BIO-147 and ESS-147. The new, lower level course would fulfill a GE science requirement for SSHA students, and is an elective lower division science course for SNS and SOE students.
Total Contact/Non-contact Hours Per Week	Lecture: 3 contact, 6 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 1 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	60
Maximum Enrollment Reason	----
Cross-listing	ESS 047
Conjoined	
Cross-listed Schools	Natural Sciences

Can this course be repeated?	No
How many times?	
Resource Requirements	TA for 1 hour discussion sections
Does this satisfy a General Education Requirement?	Yes
Course Outline and/or Additional Documentation	 AstroBio-S14-Syllabus-May31.doc.pdf (192Kb)

University of California, Merced
ASTROBIOLOGY
Spring 2014 – BIO/ESS 147 – CRN # 4171 / 4261

Academic Calendar Spring Semester 2014

Martin Luther King Jr. Holiday	Monday	January 20, 2014
Spring Instruction Begins	Tuesday	January 21, 2014
Presidents Day Holiday	Monday	February 17, 2014
Spring Recess	Monday - Thursday	March 24 - 27, 2014
Cesar Chavez Holiday	Friday	March 28, 2014
Instruction Ends	Friday	May 9, 2014
Final Exam, Astrobiology	Friday, 11:30 am – 2:30 pm CLSSRM 282	May 16, 2014
Spring Semester Ends	Friday	May 16, 2014
Final Grades Due	Tuesday at Noon	May 20, 2014

Syllabus, Spring 2014

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Lecture: Tue & Thu 01:30-02:50 pm, CLSSRM 282
Discussion: Wed 02:00-02:50 pm, CLSSRM 129
 4 units (3 hours of lecture and 1 hour discussion)

Instructor: Dr. Wil van Breugel
wvanbreugel@ucmerced.edu, ph. 209-228-4686 (College One office)
 Office hours: by appointment

Teaching Assistant: Debra Conte – dconte@ucmerced.edu - AOA 161 (contact her for office hours)

Course Description:

Astrobiology refers to the study of the origin and evolution of life in the cosmos: What is life, how did it form, and where is it? It is an integrative, multidisciplinary field that includes areas of astronomy, biology, (bio)chemistry, geology, and physics. After a brief review of how humans have attempted to address these questions in the past we will look at the foundations on which modern astrobiology is built:

- Our deep connection to the cosmos
- The formation and evolution of planets like Earth
- The key physical, chemical and biological processes that may help us understand the origin and evolution of life
- How life survives in extreme environments
- The search for extraterrestrial life in our solar system and elsewhere
- Ethical considerations of astrobiology related research and exploration, and of potential encounters with extraterrestrial intelligent life forms

The lectures are put together from a variety of textbooks and conference proceedings, as well as some popular (but decent) science books. A few of the lectures are cobbled together from

various other sources, including previous lectures by Prof. Monica Medina (prev. UCM), and Prof. Imke de Pater (UCB)

I will loosely follow the textbook, with updated material where needed:

PLANETS & LIFE: THE EMERGING SCIENCE OF ASTROBIOLOGY

Ed. by Woodruff T. Sullivan III & John A. Baross

Cambridge University Press; 2007; ISBN 978-0-521-53102-3 paperback

Chapters and information from some other books used are:

ON PLANETARY EVOLUTION

Planetary Systems and the Origin of Life

Ralph Pudritz, Paul Higgs & Jonathon Stone, Eds.

Cambridge University Press; 2007; ISBN 978-0-521-87548-6 hardback

and also

Extrasolar Planets and Astrobiology

Caleb Scharf

University Science Books; 2009; ISBN 978-1-891398-55-9 hardback

ON WATER

Water and Life: The unique properties of H₂O

R.M. Lynden-Bell et al., Editors

CRC Press; 2010; ISBN 978-1-4398-0356-1 hardback

ON BIOTHERMODYNAMICS

Biological Thermodynamics

Donald T. Haynie

Cambridge University Press; 2 edition (March 10, 2008); ISBN 978-0-521-71134-0 paperback

See also <http://www.biologicalthermodynamics.com/index.htm>

ON ORIGINS OF LIFE

Singularities

Christian de Duve

Cambridge University Press; 2009; ISBN 978-0-521-84195-5 hardback

and also

Fitness of the Cosmos for Life

J.D. Barrow, S.C. Morris, S.J. Freeland & C.L. Harper, Eds.

Cambridge University Press; 2008; ISBN 978-0-521-87102

ON SYNTHETIC BIOLOGY

Life in the Universe ... and the Scientific Method

Steven A. Benner

The FfAME Press; 2009; ISBN 978-0-615-26745-6 paperback

ON ASTROBIOLOGY AND ETHICS

Encountering Life in the Cosmos:

Ethical Foundations and Ethical Implications of Astrobiology

C. Impey, A.H. Spitz & W. Stroeger, Editors

The University of Arizona Press; 2013; ISBN 978-0-8165-2870-7 paperback

An important book of historical interest, and which might be considered the beginning of the scientific search for the origin of life is by the quantum mechanics physicist Edwin Schrodinger:

What is Life?, Mind and Matter, and Autobiographical Sketches

E.dwin Schrodinger (based on lectures given 1944 and 1958)

Cambridge University Press; 2004; ISBN 0-0521-42708-8 paperback

Learning Objectives (instructor will):

- Introduce students to a broad spectrum of natural sciences
- Cultivate intellectual curiosity about the origin and evolution of planets and of life
- Show how different science disciplines are needed to approach such a complex problem as the origin of life
- Demonstrate interdisciplinary analytical thinking, problem-solving, decision-making, and ethical considerations
- Review effective strategies for learning and presenting

Learning Outcomes (students will be able to):

- Organize and assess information from a variety of natural science disciplines
- Understand the value of interdisciplinary sciences for developing new, forefront science directions
- Appreciate the value of a new interdisciplinary science such as astrobiology for broad, general science education
- Apply what they have learned by presenting case studies of astrobiological topics of their choice

Procedures and Guidelines:

Lectures: This course is multi-disciplinary and fast-paced, with nearly every lecture devoted to new ideas. **It is imperative that students come to class and attendance will be taken.** Not keeping up will put you hopelessly behind. During the lecture students are expected to take notes; and are also asked to write down questions on index cards that can be picked up at the beginning of class and dropped off at the end of class. We will discuss some of these questions during class and / or in the discussion sections. The below 5 questions can serve as a general guide:

Reflection on learning

1. Which of the concepts presented in class are difficult for you?
2. What was the key concept today?
3. What else would you like to know about the topic?

Critical thinking

4. Describe a connection between today's lecture and recent news issues (science, technology, politics, economic, etc.)
5. Describe how your own personal background and thinking (cultural, ethnic, education, religion, experience, gender) may affect your interpretation of the material presented today

Discussion Sections: The TA will determine how the discussion sections will be conducted.

Panel Discussion: If time permits there may be a panel discussion during the semester. Students will be assigned a topic to discuss, as well as a position of for or against. This will provide a review of the material discussed in the lecture and the discussion, as well as allow students to formulate opinions on present topics in Astrobiology.

Course Requirements:

- Class participation and attendance: Attendance will be taken for both class and the discussion sections
- Required readings: Lecture slides
- Course readings: Some chapters of books covered in the lectures
- Course assignments and projects: To be determined

Midterms & Final: You will be given three midterm and a final exam. The midterms will be in class exams. No make-up exams will be given unless there are exceptional circumstances justified by the appropriate documentation. Students who have a documented reason (such as a religious observance or scheduling conflict with another exam) may request to take the midterm exam *at a different time* the scheduled exam time.

Grading: Your learning will be assessed as follows:

15%	midterm 1
15%	midterm 2
15%	midterm 3
20%	discussion and participation (this includes being present at all lectures and discussion sections)
20%	student presentation and report
15%	final exam

Exam regrading: Midterm exams may be submitted for regrading if the student believes that errors were made in the grading. Requests for regrading must be made within a week of the exam being returned. Exams submitted for regrading will be completely regraded, so that the resulting grade may be higher or lower than the original grade.

Student presentation/report: You will be expected to work in groups of 2 or 3 and choose a topic of relevance to astrobiological research. It can come from topics discussed in class but your presentation should go into more depth and provide new insight from the most recent literature in *peer reviewed journals*. You are welcome to discuss your topic of choice with your instructors and T. A. Your presentation will be 15 minutes long. Your report has to be at least 3,000 words, excluding figure legends and references. The presentations will be judged following an oral presentation rubric (attached). Work (such as a powerpoint slide) prepared by each individual in a group must be labeled as such.

Academic integrity: Academic honesty is a core value of the University of California and the central rule of academic honesty is that you must do your own work. While it is acceptable to work in groups to study, it is completely unacceptable to receive assistance of any kind on exams. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* and is available via the UCMCROPS site

<http://studentlife.ucmerced.edu/2.asp?uc=1&lvl2=121&lvl3=121&lvl4=123&contentid=171>. For additional information visit (<http://studentlife.ucmerced.edu/>).

Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct that you witness.
- Know the rules -- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Astrobiology Websites:

<http://astrobiology.nasa.gov/> (U.S.A.)

<http://www.astrobiologysociety.org/> (U.K.)

<http://en.wikipedia.org/wiki/Astrobiology>

<http://www.astrobiology.com/>

Astrobiology Journal:

<http://online.liebertpub.com/loi/ast>

Astrobiology Books:

“Encountering Life in the Universe: Ethical Foundations and Social Implications of Astrobiology”, 2013. Eds. Chris Impey, Anna H. Spitz, and William Stoeger, University of Arizona Press. ISBN 978-0-8165-2870-7.

“Water and Life: The unique properties of H₂O”, 2010. Ed. Ruth M. Lynden-Bell, Siman Conway Morris, John. D.Barrow, John J. Finney, and Charles L. Harper, Jr. CRC Press. ISBN 978-1-4398-0356-1. hardcover

“Extrasolar Planets and Astrobiology”, 2008. Caleb A. Scharf. University Science Books. ISBN-10 1891389556 / ISBN-13 978-1891389559. hardcover

“Fitness of the Cosmos for Life”. 2008. Ed. John D. Barrow, Simon Conway Morris, Stephen J. Freeland & Charles L. Harper, Jr. Cambridge University Press. ISBN 978-0-521-87102-0. hardcover

“Life in the Universe: Expectations and Constraints”, Second Edition 2008. Dirk Schulze-Makuch & Louis N. Erwin. Springer Verlag. ISBN 978-3-540-76816-6. hardcover

“Planets and Life: The emerging science of astrobiology”, 2007. Ed. Woodruff Sullivan & John Baross. Cambridge University Press. ISBN 978-0-521-82421-7.

“Planetary Systems and the Origins of Life”, 2007. Ed. By Ralph Pudritz, Paul Higgs & Jonathan Stone. Cambridge University Press. ISBN 978-0-521-87548-6. hardcover

Astrobiology Syllabus, Spring 2014, WvB

“Complete Course in Astrobiology”, 2007. Ed. by G. Horneck & P. Rettberg. Wiley-VCH. ISBN 978-3-527-4-660-9.

“Life in the Universe”, 2007. J. Bennett & S. Shostak. Pearson Education Inc. ISBN 0-8053-4753-4.

“Astrobiology”, 2006. Kevin W. Plaxco & Michael Gross. The Johns Hopkins University Press. ISBN 0-8018-8367-9.

“Astrobiology: A Multidisciplinary Approach”, 2005. J.I. Lunine. Pearson Education Inc. ISBN 0-8083-8042-6.

“Singularities”, 2005. Christian de Duve. Cambridge University Press. ISBN 978-0521-84195-5. hardcover


“Life in the Universe: From the Miller Experiment to the Search for Life on other Worlds”, 2004. Ed. by J. Seckbach, J. Chela-Flores, T. Owen & F. Raulin. Kluwer Academic Publishers. ISBN 1-4020-3093-2.

“Chemical Evolution and the Origin of Life”, 2008 (original German version 2004). Horst Rauchfuss. Springer Verlag. ISBN 978-3-540-78822-5 hardcover

“Astrobiology: The Quest for the Conditions of Life”, 2001. Ed. by G. Hornbeck & C. Baumstark-Khan. Springer-Verlag. ISBN 3-540-42101-7

BIO 147: Astrobiology

Course Title	Astrobiology
Abbreviated Course Title	Astrobiology
Course Subject	BIO
Course Number	147
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	Fall 2015
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	CORE 1 plus any of the following: BIO 1, BIO 5, PHYS 6, PHYS 8, CHEM 2, or ESS 1, or consent of instructor
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	The study of the origin and evolution of life in the cosmos includes areas of biology, astronomy, geology, chemistry & physics. We will cover three main themes: how did life begin and evolve? does life exist elsewhere in the universe? and what is life's future on Earth and beyond?
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Discontinuance BIO 047 replaces current upper level Astrobiology BIO-147 and ESS-147. BIO 047 as a lower level course will fulfill a GE science requirement for SSHA students, and an elective lower division science course for SNS and SOE students.
Brief Explanation of Change(s)	Lecture: 3 contact, 6 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 1 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Contact/Non-contact Hours Per Week	12
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	100
Maximum Enrollment Reason	----
Cross-listing	ESS 147
Conjoined	

Cross-listed Schools	----
Can this course be repeated?	No
How many times?	
Resource Requirements	TA at appropriate percent time to lead discussion section. LCD projector.
Does this satisfy a General Education Requirement?	Yes
Course Outline and/or Additional Documentation	 BIS ESS 147 Breugel Van Wil Spring 2008.pdf (43Kb)

Astrobiology BIS 147/ESS 147 – Spring 2008

Tuesdays-Thursdays 1:30-2:50 pm, COB 267

Discussion: Fridays 12:00-12:50 pm, COB 264

4 units (3 hours of lecture and 1 hour discussion)

Instructors: Dr. Wil van Breugel (office hours: 12:00-1:30 pm, COB 226), Dr. Mónica Medina (office hours: Mondays 3:00-5:00 pm, SE 314)

Teaching Assistant: Michael DeSalvo (office hours: TBD)

Course description: Astrobiology refers to the study of understanding the origin and evolution of life in the cosmos. It is an integrative, multidisciplinary field that includes areas of biology, astronomy, geology, chemistry and physics. Students will be confronted with some of the most fundamental topics addressed by science today such as who we are, where we came from, and where we might go. We will cover three main themes: how did life begin and evolve? does life exist elsewhere in the universe? and what is life's future on Earth and beyond?

Textbook: "Astrobiology: A Brief Introduction" K.W. Plaxco & M. Gross. 2006. Johns Hopkins University Press. ISBN 0-8018-8366-0

Grading: Your learning will be assessed as follows:

15%	midterm1
15%	midterm 2
15%	midterm 3
10 %	discussion
20%	student presentation and report
25%	final exam

Midterms: You will be given three midterms. The midterms will be in class exams. No make-up exams will be given unless there are exceptional circumstances justified by the appropriate documentation. Students who have a documented reason (such as a religious observance or scheduling conflict with another exam) may request to take the midterm exam *at a different time* the scheduled exam time.

Exam regrading: Midterm exams may be submitted for regrading if the student believes that errors were made in the grading. Requests for regrading must be made within a week of the exam being returned. Exams submitted for regrading will be completely regraded, so that the resulting grade may be higher or lower than the original grade. All mid-term exams will be photocopied after the initial grading. If a comparison of the photocopy and the exam submitted for regrading indicates any alteration, the case will be forwarded to the Office of Judicial Affairs. The final manuscript will be graded as a peer reviewed publication and will be available to students of the following semester.

Student presentation/report: You will be expected to work in groups and choose a topic of relevance to astrobiological research. It can come from topics discussed in class but your presentation should go into more depth and provide new insight from the most recent literature in *peer reviewed journals*. You are welcome to discuss your topic of choice with your instructors

and T.A. Your presentation will be 15 minutes long. Your report has to be at least 3,000 words, excluding figure legends and references.

Academic integrity: Academic honesty is a core value of the University of California and the central rule of academic honesty is that you must do your own work. While it is acceptable to work in groups to study, it is completely unacceptable to receive assistance of any kind on exams. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* and is available via UCMCROPS site. For additional information visit (<http://studentlife.ucmerced.edu/>). Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct that you witness.
- Know the rules -- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Darwin Day: Professor Antonio Lazcano. UNAM. “The Origin of Life on Earth: An Evolutionary Perspective”. Friday Feb 15, 3-5 pm COB 105 + COB 102 (overflow)

Other reference books:

“Life in the Universe: From the Miller Experiment to the Search for Life on other Worlds” Ed. by J. Seckbach, J. Chela-Flores, T. Owen & F. Raulin. 2004. Kluwer Academic Publishers. ISBN 1-4020-3093-2.

“Astrobiology: The Quest for the Conditions of Life” Ed. by G. Hornbeck & C. Baumstark-Khan 2001. Springer-Verlag. ISBN 3-540-42101-7

“Complete Course in Astrobiology” Ed. by G. Horneck & P. Rettberg, 2007. Wiley-VCH. ISBN 978-3-527-4-660-9.

“Life in the Universe” J. Bennett & S. Shostak, 2007. Pearson Education Inc. ISBN 0-8053-4753-4.

“Astrobiology: A Multidisciplinary Approach” J.I. Lunine. 2005. Pearson Education Inc. ISBN 0-8083-8042-6.

“Biological thermodynamics”. 2001. Donald T. Haynie. Cambridge University Press. ISBN 0-521-79549-4.


“Planets and Life: The emerging science of astrobiology”. 2007. Ed. Woodruff Sullivan & John Baross. Cambridge University Press. ISBN 978-0-521-82421-7.

Schedule

Lecture	Date	Concepts	Instructor	Reading
1	T, Jan 22	What is astrobiology	WVB, MM	Chapter 1
2	Th, Jan 24	Historical background and definitions	MM	
3	T, Jan 29	Cosmic foundations	WVB	Chapter 2
4	Th, Jan 31	Planet formation and early Earth	WVB	Chapter 3
5	T, Feb 5	Physics of chemistry	WVB	WVB
6	Th, Feb 7	Midterm review	WVB	
7	T, Feb 12	Midterm		
8	Th, Feb 14	Primordial soup	MM	Chapter 4
9	T, Feb 19	Sparks of Life	MM	Chapter 5
10	Th, Feb 21	Bio-thermodynamics I	WVB	Haynie
11	T, Feb 26	Bio-thermodynamics II	WVB	Haynie
12	Th, Feb 28	Molecules to Cells	MM	
13	T, Mar 4	Diversification of life I	MM	Chapter 7
14	Th, Mar 6	Diversification of life II	MM	
15	T, Mar 11	Midterm review	MM	
16	Th, Mar 13	Midterm		
17	T, Mar 18	Extremophiles on Earth	MM	Chapter 8
18	Th, Mar 20	Planetary evolution	WVB	
	Mar 24-28	Spring break		
19	T, Apr 1	Life on Mars?	WVB	Chapter 9
20	ThApr 3	Significance of Europa and Titan	MM	
21	T, April 8	Snowball Earth and the Cambrian Explosion	MM	
22	Th, Apr 10	Evolution of intelligence	MM	
23	T, April 15	Planetary protection	MM	
24	Th, April 17	Midterm review	MM	
25	T, Apr 22	Midterm		
26	Th, Apr 24	Life elsewhere	WVB	Chapter 10
27	T, Apr 29	Extrasolar planetary systems and life	WVB	
28	Th, May 1	Student presentations		
29	T, May 6	Student presentations		
30	Th, May 8	Student presentations		
31	T, May 13	Final review	WVB, MM	
	TBD	Final Exam		

NSUS 010: Success in NatSci Preparatory

Course Title	Success in NatSci Preparatory
Abbreviated Course Title	Success in NatSci Preparatory
Course Subject	NSUS
Course Number	010
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	2
Upper Unit Limit	
Prerequisites	
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	Natural Sciences majors only
Class Level Restrictions	
Course Description	Designed to empower students to achieve effective levels of performance within academic, personal, and professional endeavors through the use of proven educational and mental strategies, specifically within Natural Science majors.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course Number New Title The School of Natural Sciences would like to begin using a new subject code, NSUS, for our Natural Sciences Undergraduate Studies courses. These courses are currently offered under the NSED subject code as NSED 098: Success in NatSci Preparatory and NSED 098: Success in NatSci Excellence, a practice which creates significant confusion for students as the courses are not included in Natural Sciences Education minor program and are not similar in structure to other 098, 198 & 298 courses. With the new NSUS courses, NSED 098 will remain to exist as a 098 course similar to other 098 courses and NSUS 010: Success in NatSci Preparatory and NSUS 020: Success in NatSci Excellence as stand alone courses. Lecture: 1 contact, 1 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 2 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Brief Explanation of Change(s)	
Total Contact/Non-contact Hours Per Week	
Total Hours Per Week	6

Grading Options	Pass/No Pass Option for Everyone
In Progress Grading	
Maximum Enrollment	40
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	
Cross-listed Schools	----
Can this course be repeated?	Yes
How many times?	12
Resource Requirements	Teaching Assistant(s) for discussion sections; assigned per SNS policy. Discussion sections will be mandatory and TAs or the instructor will be responsible for managing discussion sections. Basic IT support (e.g., course web page with supplemental material). Basic classroom needs: whiteboard, projector and screen.
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 NSUS010 Syll Spr 2015 - Preparatory.pdf (842Kb)



NSUS 010

Success in Natural Sciences: Preparatory Emphasis

Note: dates/topics for lectures, discussions & guest speakers are subject to change

Course Description:

NSUS 010 is designed to empower students so that they may achieve **effective levels of performance** within academic, personal, and professional endeavors through the use of proven educational and mental strategies, specifically within Natural Science majors. Moreover, students will learn, apply, and evaluate **study strategies** including techniques to manage time, effectively record lecture notes, prepare for exams, and set realistic goals. Through instruction and small group interaction, the class will provide the **lifelong skills** to become increasingly involved in scholarship and in an overall **passion to succeed** in order to effectively **contribute to the lives of others**.

Contact Information (please use respectful **academic titles**, e.g. “**Dr.** or **Professor**”):

► **Dr. S. Mattoon:** smattoon@ucmerced.edu (Office: Grad St Serv, SSB 340a by appt)

Students are encouraged to communicate with class instructor, especially regarding forthcoming class absences and questions pertaining to assignments. Please **e-mail** if you need to schedule an appointment or to ask questions outside of class hours.

Text: Toft, D. (Ed.). (2014). *The Essential Guide to Becoming a Master Student* (3rd edition). Boston MA: Cengage Wadsworth. **ISBN-10:** 1-285-08099-8 **ISBN-13:** 978-1-285-08099-4 [**new copy required--used copies not allowed**; purchase at Bookstore, or procure **paperback** text from publisher <http://www.cengagebrain.com/shop/search/9781285080994> then download free chapters as needed for first 2 weeks; also available from Amazon 2-day shipping but must arrive by 1st disc for in-class graded assignment; online copy is incompatible with some exercises]

Also access *Reader for Success in Natural Sciences* – appended to this syllabus

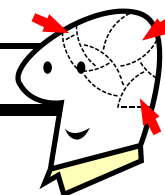
Class Times: Lectures T 12:30-1:20 pm COB 282

Discussions M 9:30-11:20 am or 11:30-1:30 pm, both in COB 262

Specific Objectives and Outcomes:

- Increase awareness of beliefs, choices, and behaviors required to meet UC academic rigor (requirements) and to succeed in university studies
- Assess and inventory current strengths and areas for growth so that students may further develop skills to improve performance in math and science
- Provide use of, knowledge of, and access to campus support staff/programs, emphasizing resources within the School of Natural Sciences
- Encounter the diversity of majors and careers within life and physical sciences
- Explore and enhance transferable academic, personal, and career skills

SUCCESS = DISCOVERY + INTENTION + ACTION



Course website:

The NSED 98 website is a part of the UCM course management system and will be automatically available to the students enrolled in the class. (<https://my.ucmerced.edu>) Visit the course website to find class materials & lecture notes under “Resources” tab and graded scores under “Gradebook” tab. Students may access “course companion” free supplemental resources at the Cengage website.

Course Format:

- The Lecture hour will consist of presentations by instructors & guest speakers.
- The Discussion will consist of assigned readings from journals, analysis of a research paper (optional), short assignments, as well as Guided Problem Evaluations (not HW completion) pertaining to math & sci classes. Individualized learning will reinforce skills learned in classwork. The format for both lecture & discussion sections will be interactive and will involve participation.
- **Grading:** This is a **two-unit graded course** (P/NP option available). **Late work** will be accepted only in cases of **timely notice** (within 12 hr of class mtg) that is documented regarding health or family emergencies. Extra credit work may be given to class at instructor’s discretion. Grading will be based on the following:

Assignments (subject to minor changes)	Max Pts	% of Total	My Scores @
Attendance: 13 lect & 13 disc (5 pts ea mtg)	130	13%	
10 Guided Problem Evaluations (Reader p.7); 15 pt ea: 3 pt bring sci text + 2 pt bring sci notes + 2 pt bring sci syllabus + 4 pt follow rubric/effort + 4 pt explanation & analysis at conceptual level using complete thoughts – finish during disc sessions)	150	15%	
12 Wk Action Plans (from Rdr) & 10 Discovery-Intention Plans (in EBAMS text) -- 5 pts each; both completed prior to & submitted during discussion mtgs	120	12%	
10 Assignments from Text & Reader (10 pts each) submitted online via CROPS	100	10%	
10 Text Chapter Quizzes (20 pt ea) in discussions	200	20%	
2 Progress Reports (25 pts each) submitted in disc	50	5%	
Math Autobiography (25 pts draft + 100 pts final copy submitted online; 25 pts presentation in class)	150	15%	
Portfolio summary including oral presentation	100	10%	
Research Paper ex credit (25 pts draft + 50 pts final copy submitted online; 25 pts oral pres in class)	[100]	[+10%]	
Totals:	1000	100%	


@ reconcile with gradebook; est grade % = (total earned to date)/(total possible to date) * 100%

A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F < 60%



SUCCESS = DISCOVERY + INTENTION + ACTION

Assignment Submission Requirements:

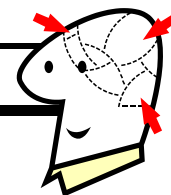
1. When directed, submit online assignments in computer-written format:
 - a. Use **MS Word** (not MS Works), **double-spaced & 12-point font**, including your **assignment title in the file name**.
 - b. Online assignments must be submitted as **MS Word (not Works) non-compressed files**. [Exception: weekly action plans, discovery/intention plans, quizzes & expanded syllabi will be completed during discussions without use of computers.] Submit **online work prior to deadline noted by instructor**; late submissions will be accepted only for timely & documented notice of emergencies as noted above.
2. All assignments submitted for a grade must be your own independent work. Any sources of information used must be properly cited. Re-wording the work of others and presenting it in your writing is plagiarism; submitting such assignments is considered cheating and is subject to further disciplinary actions. For details, see <http://studentlife.ucmerced.edu/> (click on "Student Judicial Affairs" and then "Academic Honesty Policy").

CAUTION 3. Students electing NS majors must pass either MATH 005 or MATH 011 or MATH 021, and either CHEM 001 or CHEM 002, with a C- or better, prior to the start of the third regular (Fall/Spring) semester; students who fail to do this are ineligible for continued enrollment in a Natural Sciences major and are moved to undeclared status. Students who earn mid-term grades of "D" or "F" in any class will be required to attend an **advising workshop** prior to registration in the subsequent term. Also, probationary students who subsequently earn "D" or "F" course grades in any course may be subject to dismissal from UCM. View details at http://ns-advising.ucmerced.edu/pub/advisor_docs/NS_Advising_Academic%20Policies.html

Attendance and Behavior:

Attendance will be taken during each lecture and discussion meeting; 5 points credit will be earned by those who attend on timely basis within 5 minutes of class starting time. In case of illness or other extenuating circumstances, contact the instructor as soon as possible and bring proper documentation. Behavior which interferes with the class work is not allowed. Unless otherwise instructed, **cell phones and computers must be off/silent while lectures are in session. Violators will be required to exit the classroom with loss of attendance points for affected sessions.**

SUCCESS = DISCOVERY + INTENTION + ACTION



Disability Services Information:

The **NSUS** classes are open to all students. If you are a student with a disability, please contact an instructor or disabilityservices@ucmerced.edu located in KL, West Wing, room 109. For information, link to <http://disability.ucmerced.edu.Attendance>


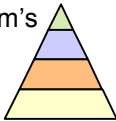


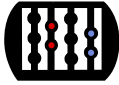


In this class, there are no secrets, no victims, and no solos

UC Merced Deadlines (from Registrar)

Instruction Begins	1/20/15
*Course Add	1/27-2/9 at Stu First Ctr w Instr Perm
*Course Drop (without W)	By 2/9 online
*Course Withdrawal (resulting in W & fee)	Between 2/10-4/7 w Instr & Dean perm
Final Exams (none for NSED98)	5/15-19

Class Schedule

Date	Mon. Discussions	Tues. Lecture	Most HW due beg of disc; other work due as noted by prof
1/20/15	Holiday Buy NEW printed text to arrive by next discussion!!	Text Intro: Getting Involved: DISCOVER WHAT YOU WANT!	
1/26-27	Discovery Wheel & Lrng Styles Inventory; read INTRO to prepare for open-book quiz during first 15 minutes of this week's discussion;	Multiple intelligences; Ch 1 Using Your Learning Styles: IDEAS ARE TOOLS; guest Dr. Jay Sexton, environmental sciences	Bring copies of online syllabus, current wk reader worksheet & NSED text + sci/math text & syllabus to each discussion beg 1st wk; Weekly quiz (based on lectures & chap asst) beg of each discussion; check UC Webmail for updates
2/2-3	Accepting resp; Guided Problem Evaluation rubric; Math Autobiog; Bloom's Taxonomy (rdr p.6) 	Ch 2 Taking Charge of Time & Money	Quiz Ch 1 in disc; weekly action plan (copy rdr p. 8); Disc & Intention journal (write in text); Guided Prob Eval
2/9-10	Skill acquisition models; Time monitor/time plan; financial planning; cost & benefit of education; local resources	Guests Dr. Holly Mayo, Director, Disability Services; Greg Spurgeon, Assoc Dir Health Serv, and Liz Wiggins, Nurse; Ch 3 Achieving Your Purpose for Reading: NOTICE YOUR PICTURES & LET THEM GO	Quiz Ch 2; WAP; D&I journal; GPE Prezi (concept map) due (bring sci/math text/syllabus each wk); review holistic grading
2/17	Holiday	Research techniques and styles of pres; guest Dr. Mayya Tokman, Asst Prof Applied Math; Director Cal Teach Initiative for K-12 sci/math teachers	WAP due in lecture; Quiz Ch3 due as email attachment by Tues 8pm

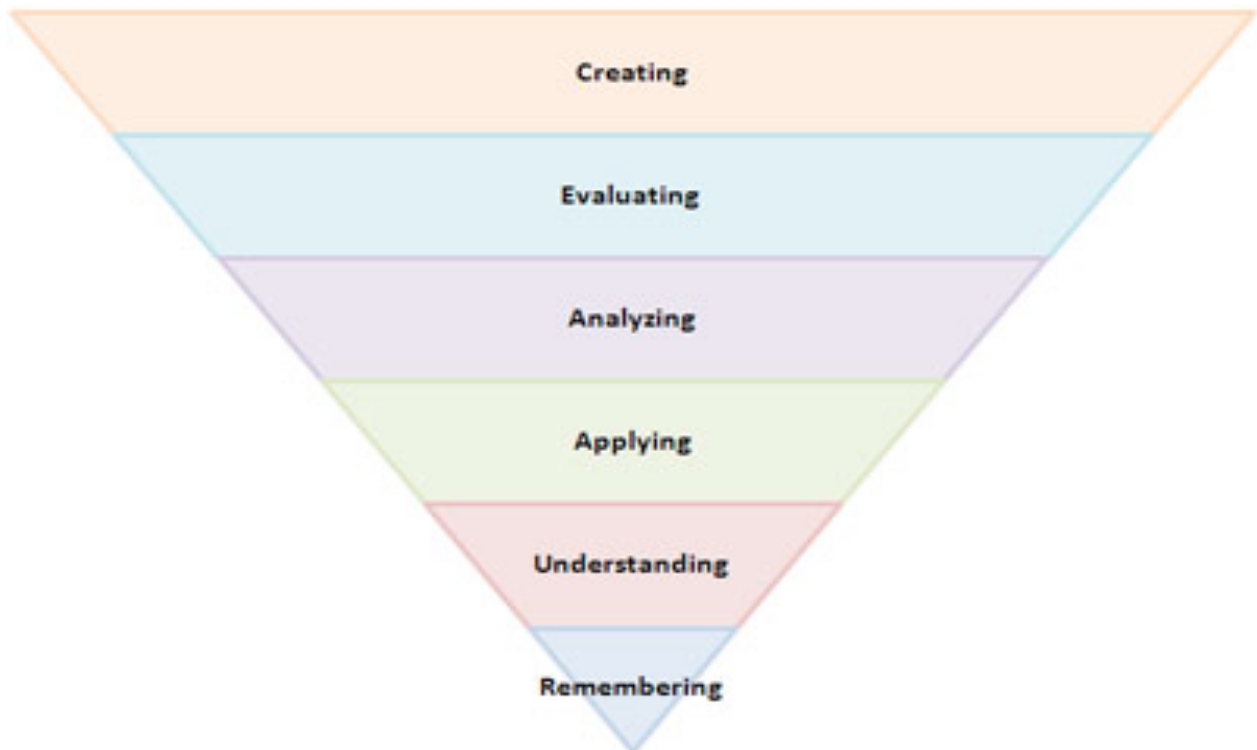
Date	Mon. Discussion	Tues. Lecture	Most HW due beg of disc; other work due as noted by prof
2/23-24	Choosing research paper topic (this worksheet is required of all, incl min 5 headings & 3 full reference citations)	Ch 4 Participating in Class & Taking Notes: CREATE IT ALL; James Barnes, Asst Dir Bright Success Center	Midterm Quiz; WAP; D&I journal; Guided Problem Evaluation; Math Autobiog draft (rdr p. 12) 
3/2-3	Note-taking essentials & formats; show up often	Ch 5 Maximizing Your Memory & Mastering Tests: --DETACH; (bring recent exam/quiz) ; guests Dr. Petia Gueorguieva, STEM Coordinator & chemist; also Dr. De Acker, UCM Ombuds	Quiz Ch 4; weekly action plan; D&I journal; GPE; "Beginning a research paper" worksheet (reader p. 13); Math Autobiog final copy
3/9-10	Disarm tests; predicting questions; key words in essay questions; disarm test anxiety	Ch 6 Using Tech to Succeed: LOVE YOUR PROBLEMS; grant intern opp; Jorge Arroyo, UROC Coordinator	Quiz Ch 5; WAP; D&I journal; Guided Problem Evaluation; Research Paper draft (ex cr); Progress Report #1 (Rdr, p.4)
3/16-17	Uncovering assumptions; common mistakes in logic; overcoming stereotypes; ways to solve problems	NS Reg Workshop by NS Advisor {tentative}; Rachel De Vera	Quiz Ch 6; weekly action plan; D&I journal; GPE; midterm/exam self-evaluations (from reader) & course eval
3/23-27		Spring Break	
3/30-31	Communication loop; conflict mgt; commun across cultures & disabilities; plagiarism	Ch 10 CHOOSING YOUR MAJOR & PLANNING YOUR CAREER ; Robert Goodman, STEM specialist	Midterm Quiz; weekly action plan; D&I journal; Guided Problem Evaluation
4/6-7	Reg online for next term	Ch 9 Choosing Health: SURRENDER; choosing approp stress relief; Maynard Medefind, Ranger, Biologist	WAP; Discovery Wheel update (text); GPE; Research paper (extra credit)
4/13-14	Research presentations (extra credit); conflict mgt; embracing diversity	Ch 8 Creating Positive Relationships: CHOOSE YOUR CONVERSATIONS & COMMUNITY; Vernetta Doty, Assoc Dir, Student Life	Quiz Ch 9; WAP; D&I
4/20-21	Research presentations (ex credit)  WHO is this?	Ch 7 Thinking Clearly & Comm Ideas: EMPLOY YOUR WORD; Importance of Integrity; Colson videos; Portfolio presentations	Quiz Ch 8; WAP; D&I {◀ caduceus staff was carried by Hermes/Mercury who guided dead & protected merchants, shepherds, gamblers, thieves; logo of World Health Org }
4/27-28	Portfolio presentations	TBA	Quiz Ch 7
5/4-5	Portfolio presentations	TBA	Online course evaluation; Progr Rpt #2 (rdr p. 10) & Portfolio Rubric (rdr p. 15)
5/11-12	No discussion	No lecture {final exams for other classes}	

**UC Merced used 98 Reader for
LOWER DIVISION DIRECTED GROUP STUDY
(Success in Natural Sciences: Preparatory)**

Contents

BLOOM'S TAXONOMY OF LEARNING OBJECTIVES
(Anderson & Krathwohl, 2001)
GUIDED PROBLEM EVALUATION RUBRICS
WEEKLY ACTION PLAN
STUDY GROUP PLANNER
PROGRESS REPORT
EXAM EVALUATION
MATH AUTOBIOGRAPHY RUBRIC
RESEARCH PAPER RUBRIC
PORTFOLIO RUBRIC

Bloom's Taxonomy



Revised edition by Lorin Anderson (a student of Bloom)



Guided Problem Evaluation (use sci text/supplements & sci syllabus)

Option 1: "Why Paper" or whiteboard solution demo by study group members

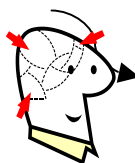
Sci HW Problem Solution {complete <u>at least one</u> solution using very <u>detailed</u> explanations}	Why? Explain each solution step {complete work on whiteboard or on full sheets of scratch paper; fold paper in half lengthwise}
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Option 2: Expanded Syllabus

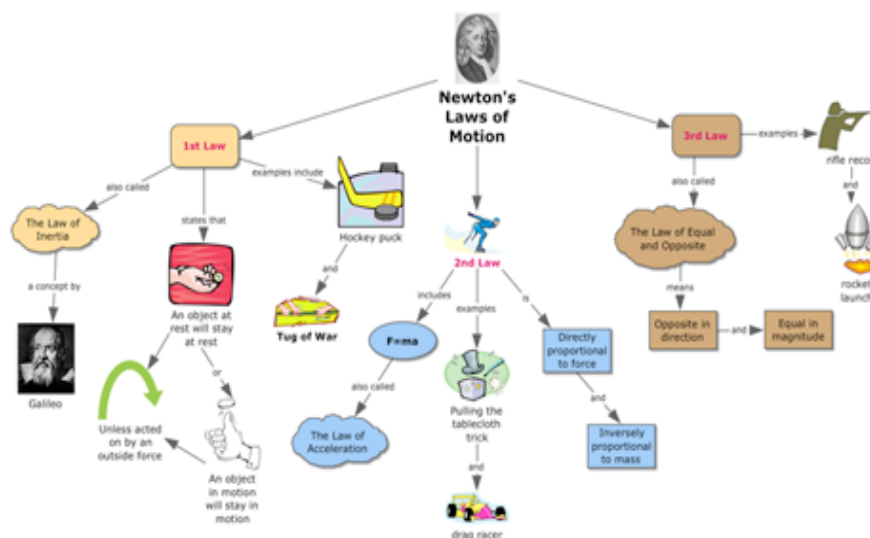
Premise: expert users of a syllabus can imagine the concepts, facts and questions that will be covered in a course just by reading the timetable, introduction & learning outcomes; we want to see those imaginations on paper as study guides developed via self-sufficiency & self-direction, also leading to discovery of gaps in knowledge.

Instructions: create an outline or chart of the course content based on the timetable of topics in your math/science course syllabus; collect pertinent materials; use the timetable from syllabus--for each topic or chapter, write major concepts, facts or ideas; display typical images, graphs or equations as well as lab demos or typical questions from HW, quizzes & exams; note questions about material that you don't understand.

Hints: use the subheadings in text; check the syllabus intro & learning outcomes; check all course materials, not just the text & lecture notes. Also check with other students & instructors to verify that you are not missing important concepts.



Option 3: Concept Map... general rubric as above but show map symbols & branches to indicate inter-relationships among map objects; explain each solution step; during 2nd week, enroll online at www.inspiration.com for 30 days free trial of v.9 *Inspiration* software (US version; Win or Mac) to complete one GPE assignment due 3rd discussion session; \$59 for optional purchase





WEEKLY ACTION PLAN Name: _____ Date: _____

Prior Week's Evaluation (beginning week 2):

<p>Evaluation: <i>Grade yourself between 1 – 10 (10 is best) regarding last week's performance of your plan. Explain why you give the grade to yourself:</i></p>
<p>Outcome: <i>List your outcomes from last week's efforts, i.e. got A on the Math 5 exam etc.</i></p>

This week's Plan: Week of _____ (mark all activities on schedule below)

Goal:			
Target Date	Action Tasks (minimum of 3 per week)	Materials Needed	Due Date

	MON	TUE	WED	THU	FRI	SAT	SUN
6-7 am							
7-8							
8-9							
9-10							
10-11							
11-12 n							
12-1 pm							
1-2							
2-3							
3-4							
4-5							
5-6							
6-7							
7-8							
8-9							
9-10							
10-11							
11-12 m							



Study Group Planner

Name: _____ Date: _____

What type of study group is this going to be?

What are the names of the people with whom you plan to study? (No more than 4)

- 1.) _____
- 2.) _____
- 3.) _____
- 4.) _____

Why are you choosing to study with these people? (Are they friends? Do they have similar academic views? What are they going to add to the group?)

Is there going to be a group leader? If so, who is it going to be and what will be the leader's responsibilities?

When is the group going to meet, how often, for how long, and where?

Who is going to teach what material and when?

What are your expectations for how you may benefit from meeting with the group?

PROGRESS REPORT



Name _____ Date _____

1. How successfully are you performing in your courses compared to the previous time that you submitted a progress report?

_____ better _____ about the same _____ worse

2. How successfully are you performing in each of your courses so far this semester? List each course by name and indicate your course grade at this point in the semester. List your exam grades, homework and/or quiz averages, and any grades on papers.

Course Name	Current Grade (A to F or %)	Exam Grades (list each)	In a few sentences, evaluate your performance in this course. What else can you do at the moment to improve your score?

3. What new study skills and strategies have you used during the past three weeks?

- a.
- b.
- c.

4. What can the instructors and mentors in this class do to help you?



Exam Evaluation Name: _____ Date: _____

Questions to ask yourself after you receive exam results:

What score did you receive out of the total points?

Was there a “Curve”? (Did the Prof change what points are required for a certain grade)

What letter grade did you receive?

Is this the grade you thought you had received?

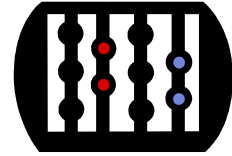
On what material did the Professor base the questions? (Lecture, Book, Section, Lab, or Assignments)

What types of questions were on the test and were they what you expected?

What types of the questions did you miss and did you know you were getting them wrong at the time?

What comments did the Prof write on your test and what can you learn from those?

Did you find any questions that you correctly answered but were incorrectly graded?



Dr. Paul Nolting (Winning at Math, 5th ed., Academic Success Press: Bradenton FL, 2008) has developed a research-based framework to improve math self-efficacy as well as to positively affect subsequent grades in math-based courses among university students. Nolting designed the “Math Autobiography” for students to self-assess their behaviors & to contemplate steps toward improving those behaviors.

Assignment:

(1) prepare computer-input response of at least **2 pages** (in MS Word, 12 point font, double-spaced) to be submitted to CROPS as assigned; (2) include at least two paragraphs regarding your memories of **math-related experiences** from earlier education and work; and (3) at least two full paragraphs of conclusion--including at least **3 behaviors & at least 2 skill/attitude changes for each behavior**--based on the Dr. Downing *OnCourse* choices of successful students (see below) and/or the Dr. Nolting behavioral change patterns (see below).

Grading: Draft = 25 pts max; final paper = 100 pts max; presentation = 25 pts max

- 90%--Follows rubric; extends to at least two full pages with the final paragraph including planned behavioral changes & solutions for each behavior; follows high standards of formal grammar & spelling incl complete, logical sentence structure
- 80%--Follows majority of requirements shown in rubric; some lack of editing and solutions compared to “A level” work
- 70%--Follows majority of requirements shown in rubric; greater lack of editing and solutions than shown in “B level” work
- 60%--Barely follows rubric; usually less than 2 pages, many logical construction errors, and no distinct behavioral solutions
- 50%--Weak attempt that is quite brief, exhibiting many errors and no solutions

Sample Conclusion: When I reflect on my experiences learning or using math, I understand why I have developed attitudes like procrastination and math anxiety. To overcome those negative attitudes, I need to improve behaviors in the areas of...
[follows Nolting pattern]

Or, in the conclusion paragraph(s), students may reflect on at least two of the following: accepting self-responsibility, discovering self-motivation, mastering self-management, employing interdependence, gaining self-awareness, adopting lifelong learning, developing emotional intelligence, and/or believing in themselves. [follows Downing *OnCourse* schema introduced in "Self-Assessment of Student Success"]



RESEARCH PAPER

Name: _____ Date: _____

You are given the opportunity to choose one of the three themes below and write a scientific paper. The first part of the assignment, “Beginning a Research Paper”, is worth **10 points** (required of all students) and will consist of choosing a topic and submitting the completed worksheet provided below. The one-page draft with at least one citation is worth **25 points (extra credit)**. The Research Paper final copy is worth **50 points (extra credit)** and will be due later in the semester; that paper may be presented (10 minute summary) for an additional **25 points (extra credit)**. Your final paper must be computer written in MS Word, in 12-point font, Times New Roman, 1” margins, with a title, double spaced, and your name, class name, and date. All references used must be properly cited. Your final copy must be at least **3 pages** long.

Beginning a Research Paper

Which theme did you choose?

What Topic will your paper cover?

What specific topics interest you that fulfill the paper requirements?

Where are you going to look for sources and will these fulfill these paper requirements?

What are all the due dates associated with this paper?

Provide a brief outline of your paper, including at least **5 pertinent section headings** plus correct citation of at least **3 references**:

RESEARCH PAPER THEMES



Theme 1: Research/Education Article Review

Using the UC Merced Library, find a journal article from a peer-reviewed scientific journal or journal on higher education. This does not include information from websites, magazines, newspapers or any other non-peer reviewed resources. This journal article could be on a topic of interest to you or it could be part of a research paper. Read and analyze the article. Summarize and answer the following questions. Provide a copy of the journal article along with your typed assignment that is at least two pages long.

Questions to be answered:

Why did you choose this Article?

What area of research or higher education is presented in the Article?

What did you learn from this Article that you didn't know before?

Why is this research (or the education topic) important?

What further research do you think could be conducted in this area of science/education?

Grading Criteria:

- ❖ CAUTION: Re-wording the article and presenting it in your writing is plagiarism
- ❖ Format described above
- ❖ Questions answered
- ❖ Proper Citations whenever needed
- ❖ Copy of the Article submitted with typed assignment
- ❖ The Article is from a peer reviewed journal

Theme 2: Biography of a well known mathematician or scientist

Choose a person who worked (or still works) in the field of math or science in the past 30 years (such as a Nobel Prize winner) and write his/her autobiography. Outline the significance of the contributions this person made in his/her research area.

Questions to be answered:

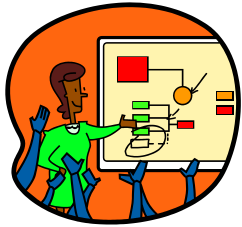
Why did you choose this person?

In what area of research does this person work? (provide details)

What are the main contribution this scientist made to his/her field of research?

Why is the research presented important?

Provide details. Write a minimum of 3 full pages following the above format. Cite at least 3 sources in MLA or APA style. Caution: avoid plagiarism!



Assignment: Be prepared to present a 10-minute summary of **what you taught yourself during this class** as described in the written evaluation. Keyboard-input the following evaluation and submit as **two-page conclusion**; provide full-sentence answers:

1. What topics or learning skills did you find most valuable?
2. What topics or learning skills did you find least valuable?
3. Summarize the key points of your Math Autobiography, including the key statements regarding behavior changes that will lead to greater learning success:
4. Summarize the key changes in your Discovery Wheel findings as you compare the results from beginning to end of class term:

Grading (follows holistic rubric shown in Math Autobiography assignment):

Thorough preparation of summary report	50 pts max
Thoughtful engagement in oral report	50 pts max

NSED 130: Technology in Education

Course Title	Technology in Education
Abbreviated Course Title	Technology in Education
Course Subject	NSED
Course Number	130
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	3
Prerequisites	
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	The course is designed for students interested in careers in education, particularly at a K-12 level. The course will teach students to use digital learning tools and to integrate technology in the classroom in an effective way, with a particular focus on using technology to support state standards in education.
TIE Code	T: Lecture
Reasons for Request	New Course
Brief Explanation of Change(s)	
Total Contact/Non-contact Hours Per Week	Lecture: 2 contact, 7 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	9
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	30
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	
Cross-listed Schools	Natural Sciences
Can this course be repeated?	No

How many times?


Resource Requirements

Does this satisfy a General Education Requirement?

Course Outline and/or Additional Documentation

The course will require classroom equipped with the standard IT equipment, i.e. an internet connection, a laptop projector and a screen.

No

 [NSED 130
Technology in
Education
Syllabus.pdf \(121Kb\)](#)

UC Merced
School of Natural Sciences
NSED 130, 3 units
Technology in Education

Course Syllabus

Course Overview:

NSED 130, Technology in Education, is a course for students interested in careers in education, particularly for those planning to teach in elementary, middle or high schools in California. This course will help students gain experience using digital learning tools and explore thoughtful and innovative ways to integrate technology into the classroom. Students will explore current educational technology advances as well as strategies for the effective integration of technology in the K-12 classroom focusing on how technology can be used to support student mastery of the Common Core State Standards and Next Generation Science Standards. Throughout this course, students will experience and design technology integrated lessons in the science and mathematics classrooms, create and maintain an educational blog and design a classroom website. Students will also learn how to model and promote digital citizenship and responsibility.

Required Text:

There is no required textbook, but there will be assigned readings throughout the semester.

Other Materials:

1. An education account on Weebly: <http://www.education.weebly.com/>
2. Access to the course Weebly
3. A gmail account (example xxxxx@gmail.com)
4. A Twitter account <https://twitter.com>

Learning Objectives:

At the conclusion of NSED 130, students will demonstrate their ability to:

- Use digital technologies to develop multimedia products to customize learning activities and assessments to address students diverse learning styles and abilities
- Collaborate with peers, students, and parents using digital tools and resources
- Advocate and model digital citizenship through safe, legal and ethical use of digital information and technology
- Communicate relevant information to students, parents and the community using a digital platform
- Use technology to promote, support and advance creative and innovative thinking and inventiveness in the classroom
- Understand the basics of computer hardware and software and implement basic troubleshooting techniques to resolve common technology based issues in the classroom.

Syllabus: continued

Relationship to Program Learning Outcomes: The skills and knowledge students will acquire in this course will contribute to the following program learning outcomes of the CalTeach/NSED program:

1. PLO 1(a,b): Learn how to become an effective teacher in the digital age.
2. PLO 2(d): Develop an ability to appropriately select and incorporate technology to enhance students' learning in the science and math classrooms.

Homework Expectations:

Each week students complete group work and/or individual work.

1. The reading/technology group assignments require each participant to read/explore a portion of the material and share it with the rest of the group. There will be discussions within the group about the material and focus question(s) that each student will answer individually. Each student will then write a statement that is a reflection on the material and the focus question(s).
2. Online threaded discussions require students to read a specific article or analyze a particular application, write an essay in response to the article/application and respond to the essays of nine other students. The threaded discussion assignments are to be done over the course of a week.
3. All students will develop a website that contains four parts and is an indication of the students' ability to apply information learned either in class or from group assignments.
4. All students will create and maintain an education blog highlighting ways to incorporate technology into the classroom.

Grading

Grading for the course will be based on letter grade.

Grading - Seminar:

Class attendance and group participation in class (including presentations) – 20%

Blog posts-30%

Discussion Assignments – 25%

Final Project – 25%

Grading Policy:

A	97-100%	C+	77-79%
A	92-96%	C	72-76%
A-	90-91%	C-	70-71%
B+	87-89%	D+	67-69%
B	82-86%	D	62-66%
B-	80-81%	D-	60-61%
F: 59% and below OR more than 3 absences			

Late Work: Barring special circumstances, all work must be turned in by 5:30 pm on the date it is due.

In order to receive a passing grade in NSED 130 you must meet *all* of the following requirements:

- Ø Attend and actively participate in the weekly seminars (missing more than 3 seminars without prior

notification and permission will result in a F / No Pass);

- Ø Complete all assignments;
- Ø Complete the final project which will include preparing a technology integrated lesson plan

Attendance:


Attendance in this course is essential due to the nature of the coursework. You are expected to be in class every week. If you need to miss class for any reason, please contact me as soon as possible. Due to the importance of the class experience, more than three absences will result in a failing grade (or a No Pass). You will receive 10 attendance points for every week you attend class. If you are late to class, that grade drops to 8 points for the week.

Academic Integrity:

Please refer to the University Policy on academic integrity. It is expected that all work for this course is your own work and that you credit any sources that you may have used. It is also expected that any work turned in for this course has been specifically created for this course. You may not use material turned in for another course as an assignment for this course.

NSUS 020: Success in NatSci Excellence

Course Title	Success in NatSci Excellence
Abbreviated Course Title	Success in NatSci Excellence
Course Subject	NSUS
Course Number	020
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	2
Upper Unit Limit	
Prerequisites	
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	Natural Sciences Majors
Class Level Restrictions	
Course Description	Training in the skills necessary to succeed at UC Merced and overview of opportunities in research, education, and careers in science.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	Other
Brief Explanation of Change(s)	The School of Natural Sciences would like to begin using a new subject code, NSUS, for our Natural Sciences Undergraduate Studies courses. These courses are currently offered under the NSED subject code as NSED 098: Success in NatSci Preparatory and NSED 098: Success in NatSci Excellence, a practice which creates significant confusion for students as the courses are not included in Natural Sciences Education minor program and are not similar in structure to other 098, 198 & 298 courses. With the new NSUS courses, NSED 098 will remain to exist as a 098 course similar to other 098 courses and NSUS 010: Success in NatSci Preparatory and NSUS 020: Success in NatSci Excellence as stand alone courses.
Total Contact/Non-contact Hours Per Week	Lecture: 1 contact, 1 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 2 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	6
Grading Options	Pass/No Pass Option for Everyone
In Progress Grading	

Maximum Enrollment	40
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	
Cross-listed Schools	Natural Sciences
Can this course be repeated?	Yes
How many times?	12
Resource Requirements	Teaching Assistant(s) for discussion sections; assigned per SNS policy. Discussion sections will be mandatory and TAs or instructor will be responsible for managing discussion sections. Basic IT support (e.g., course web page with supplemental material). Basic classroom needs: whiteboard, projector and screen.
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 NSUS 020 Syllabus S15 - Excellence Revised.pdf (178Kb)

NSUS 020: Excellence in Science Education, Spring 2015

Lecture 04: Classroom 127, Fridays 10.30-11.20am
Section 05D: Classroom 262, Fridays 11.30am-1.20pm
Section 06D: Classroom 262, Fridays 1.30-3.20pm

Lecturer: Grant Nebel (gnebel@ucmerced.edu); office hours:
Fridays 8.30-9.30am, STEM Resource Center, Academic Office Annex 114.
Fridays 9.30-10.20am (and after 3.30pm), Academic Office Annex 168.

NSUS 020 is a two-credit course with two goals: to *train* you in the skills necessary to succeed at UC/Merced; and to *show* you the opportunities in research, education, and careers in science. Students who successfully complete this course will have the skills that help them succeed in the entire range of science classes here, and will also be on their way not just to a degree but a career in science. Hopefully, students will also find this a safe space to discuss problems, challenges, and opportunities.

We have two meetings in the course, both on Fridays: a lecture and a discussion. In the **lecture**, I (or a guest speaker) will talk to you about the opportunities and challenges of learning science at Merced. (I am in the process of inviting lecturers, so watch for an update to the schedule.) On some days, our lecture activity will spill over into the discussion section. The **discussion** section will have two parts: in the first half, we will practice some of the skills necessary for college and career success; the second half will be a study hall where you can work on any kind of class or career problem. **You must be present for the entire study hall**; think of it as an opportunity to practice the discipline you'll need for success. I will be available to answer any question in this period, as well as my office hours.

Assignments and grading

There are 360 points total in the class:

In-class work ($\frac{1}{3}$ of total): short questionnaires (5 or 10 points each, 100 points total) and overall participation (20 points)

12 out-of-class assignments ($\frac{1}{3}$ of total) (10 points each, 120 points total)

$\frac{1}{3}$ of total for the final research paper (40 points), presentation (40 points), and poster presentation (40 points)

Attendance

As the saying goes, 90% of life is showing up; a professional shows up and does the job, so attendance is very much a part of your professional training. There will be a 10 point penalty for missing one class (lecture **or** discussion) without excuse; 20 points for each class (lecture or discussion) after that. If you need to miss class because of a previous obligation, you need to get permission from me before the class meets. If you have to miss class because of illness, contact me

immediately so I can register your absence as excused.

Questionnaires will be given (almost!) every week, and sometimes there will be two in one week. They can be given in lecture, discussion, or both; they will be given out and collected in class. These are brief chances to reflect on what you've done and on the topic of the day. Students with *excused* absences only will get a chance to make these up.

The **out-of-class assignments** will be scheduled throughout the semester; I've included a few of them in the schedule, but **not** all of them. They involve greater reflecting and planning than the in-class assignments. With one exception, these assignments must be submitted to me via the CROPS assignment function (or possibly email) by 10.30am on the Friday they are due; there will be one due almost every week. I would be happy to give you feedback *before* the assignments are due throughout the week. Assignments can only be accepted late by prior arrangement with me.

For the **research paper/presentation/poster presentation**, you will read, summarize, and present one scientific article. This is to train you in reading scientific literature and expressing ideas to an audience in an interesting way. Scientists use all three methods to communicate their work. We will have some assignments and discussions on these skills in the second half of the semester, so you will have a lot of practice in working up to the final product. More details to come; I will fully assign these projects by the fifth week.

There are many ways to earn the overall **participation** grade: discussions in class; discussions on CROPS; discussions in chat; meeting with me in office hours; emailing me. I will also take time to participate with students one-on-one in the study hall section of discussion; all of these will count towards participation.

Cutoffs for the grades are as follows (that is, you must get at least these points to get the grade): A: 316 total points; A-: 306; B+: 295; B: 263; B-: 252; C+: 241; C: 209; C-: 198; D+: 187; D: 144.

Keep track of your points. I will not use the CROPS grading function to save them, so you will have the chance to practice some basic addition skills.

THE SCHEDULE (this is subject to minor revision; changes will be announced and posted on CROPS)

Jan 23 (Lecture and discussion) Introduction to course; self-evaluation, setting goals. We'll review this syllabus and then discuss what you want from this course. Lecture will include short-term (semester) and long-term (college and career) goals. You will learn to set some standards for themselves and evaluate themselves every week.

Jan 30 (Lecture and discussion) Scheduling and planning. Drawing up weekly and semester schedules for yourself and learning to follow them; we will learn about budgeting time throughout every week and realistically evaluating one's ability to follow that budget. **Diary assignment due.**

Feb 6 (Lecture and discussion) We will prepare you to ask questions of your professors and to work effectively in study groups, including finding out the points of difficulty in your assignments; I may also present some effective note-taking strategies. **Scheduling assignment due.**

Feb 13 (Lecture and discussion) You will learn some writing skills, such as outlining and revising. Writing an effective outline requires breaking down larger arguments into smaller ones. Revising skills include writing, evaluating, proofreading, and correcting a rough draft. **Lecture notes assignment due.**

Feb 20 (Lecture and discussion) We will begin practicing researching skills with finding resources and using them, and telling the difference between good and bad materials online. We'll also discuss the methods scientists use for communicating with each other and evaluating each other's work, and begin the practice of critical thinking, including how to use quotes and exercises in paraphrasing articles and arguments. In discussion, you will learn how to read scientific articles, including finding arguments in an article, looking for references, and summarizing scientific work. (This will be the beginning of work for the presentations and the research essay.) **Outline assignment due.**

Feb 27 For lecture, **guest speaker to be announced.** In discussion, more about scientific communications, including colloquia, seminars, and posters. **Due this week: your choice on what scientific article you'll present and an initial evaluation of it.**

Mar 6 For lecture, **guest speaker to be announced.** **Colloquia/seminar list due.**

Mar 13 For lecture, **guest speaker to be announced.** In discussion this week: the mid-semester review. **Resource list due.**

Mar 20 (Lecture and discussion) A special learning activity that I'm keeping secret for now.

Mar 27 No class (SPRING BREAK! WHOOO!)

Apr 3 For lecture and discussion (or lecture and discussion), we will practice presenting, including making a simple, effective outline, making your material interesting, and communicating with an audience. **Due this week: evaluation**

of UC/Merced poster presentations.

Apr 10 In lecture and discussion, we'll begin writing resumes and applications, with practice in making your resume visually appealing, honest, and interesting, and promoting your own skill set. We will also practice writing a personal statement. **Annotated list of research/internship opportunities due.**

Apr 17 For lecture, we will learn about science and our society, public policy, and communicating with a general audience. We will also discuss careers outside the classic science track. In discussion, **student presentations** (students will evaluate each other's presentations) **or. . .something else.** **Personal statement due.**

Apr 24 Rough draft due (this counts as an assignment). In lecture, we'll read and critique the rough drafts. In discussion, **student presentations.**

May 1 For lecture, **poster presentations due** and a full poster session, with evaluations. In discussion, **student presentations.** **Colloquium/seminar report due.**

May 8 In lecture, an end-of-semester review. In discussion, **student presentations; final research paper due at 4pm.**

Course objectives:

1. Training students in skills for success at UC/Merced, including time management, note-taking, critical thinking, communication with professors, and outlining.
2. Familiarizing students with different aspects of a scientific career, including:
 - 2.1. Scientific research and scientific language
 - 2.2. Undergraduate research, internship, and shadowing opportunities.
 - 2.3. Various scientific careers and the training necessary for each
3. Training students in communicating scientific material in a professional and effective manner.

Learning outcomes:

1. Students will be able to implement specific strategies for academic success at UC/Merced.
2. Students will be able to access resources and pursue extracurricular research and scientific activities to further their career goals.
3. Students will be able to find, understand, and present peer-reviewed scientific research.
4. Students will develop and begin pursuit of career goals.

BIO 174: Stable Isotope Ecology

Course Title	Stable Isotope Ecology
Abbreviated Course Title	Stable Isotope Ecology
Course Subject	BIO
Course Number	174
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	4
Prerequisites	ESS 148 or consent of instructor for undergraduates.
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	Junior and senior class.
Course Description	The fundamentals of stable isotope ecology, biochemistry, and geochemistry using both lecture and lab. Isotope systematics for carbon, nitrogen, hydrogen, oxygen, and sulfur and how they operate in plants, animals, soils, microbes, and enzymes are the course's framework. Lab section will teach sample preparation and hypothesis building using stable isotopes.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course
Brief Explanation of Change(s)	New Course Number This is a new course.
Total Contact/Non-contact Hours Per Week	Lecture: 3 contact, 0 non-contact Lab: 2 contact, 1 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 3 non-contact Tutorial: 0 contact, 2 non-contact Field: 1 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	20
Maximum Enrollment Reason	----
Cross-listing	ESS 174.
Conjoined	ES 274.
Cross-listed Schools	Natural Sciences

Can this course be repeated?

No

How many times?

Resource Requirements

Classroom, Fogel's lab, needs common analytical supplies for stable isotope analysis, local transportation only.

Does this satisfy a General Education Requirement?

No

Course Outline and/or Additional Documentation



[ESS174BIO174ES274 Syllabus.docx \(39Kb\)](#)

UNIVERSITY OF CALIFORNIA, MERCED
BIO 174/ESS 174/ES 274: Stable Isotope Ecology – Syllabus

Lecture time: Mondays, Wednesdays, 1 hour and 15 minutes
Lecture location: Traditional Classroom
Lab Location: Professor Fogel's Stable isotope lab
Exam Date/Location: Research papers to be turned in by end of the semester
Credits: 4 CREDITS

Instructor: Professor Marilyn L. Fogel (mfogel@ucmerced.edu)
Science and Engineering Bldg., Rm. 294; Office Phone: 209-205-6743
Office hours: Mondays and by appointment

- I. Course Description:** This class will teach the fundamentals of stable isotope ecology, biochemistry, and geochemistry using both lecture and lab. Isotope systematics for carbon, nitrogen, hydrogen, oxygen, and sulfur and how they operate in plants, animals, soils, microbes, and enzymes will form the framework for the class. Corresponding lab section will teach sample preparation and hypothesis building using stable isotopes.

This course fulfills an upper division requirement for the Earth Systems Science Major and a requirement for the ES graduate student. You will learn about stable isotope ecology, biogeochemistry, chemistry, biochemistry, and physics. *Prerequisite: ESS 148 or consent of instructor for undergraduates. Normal Letter Grade only.*

II. Course Goals and Outcomes:

a. Course Goals:

- Learn key concepts and major topics in stable isotope ecology, including: the isotope systematics for carbon, nitrogen, oxygen, hydrogen, and sulfur; food web and trophic analysis; basic understanding of chemistry, physics, and biochemistry of isotope partitioning
- Learn to manipulate isotopic data including graphs and modeling
- Read, understand, and write about stable isotope literature
- Evaluate an ecosystem using stable isotope measurements
- Understand and experiment with the methods used in isotope ecological research
- Be able to communicate ecological knowledge to other scientists

b. Learning Outcomes: At the end of the course, students should be able to:

- Explain fundamental isotopic principles that pertain to individual organisms, to populations, to communities, to ecosystems, and to the globe.
- Describe and understand the various techniques used in stable isotope chemistry and ecology, from computation to experimental, and how these techniques are coupled with the scientific method to address ecological questions
- Critically evaluate the scientific literature, and take ownership of the course material to improve functioning in society

III. Format and Procedures:

1. This course is structured as follows: two 1 hour and 15-minute lecture sessions per week.
2. Students will be required to attend **8 3-hour laboratory sessions in Professor Fogel's Lab**.
3. Lab visits will be alternated with 8 3-hour field trips to the UC Merced's Vernal Pools and Grassland Reserve, which is adjacent to campus.
4. Graduate students will have an additional 50 discussion section.

IV. Course Requirements & Grading Procedures:**a. Class Attendance and Participation Policy:**

Students are expected to attend all lectures. This is a small class, and your participation is valuable to everyone's learning experience. Please notify me by email if you plan to miss a lecture.

b. Required and Supplemental Readings:

Required Textbook: *Stable Isotopes in Ecology and Environmental Science*, eds., Robert Michener and Kate Lajtha, Blackwell Publishing, 2nd Edition.

Supplemental Reading: Several isotope geochemistry and ecology books are available from Marilyn Fogel, in Room 294, SE1, and can be checked out for 1 week.

Reading Primary Literature: We will be covering about 5 papers per week for the lectures. You will be responsible for knowing the content, asking questions during class, and summarizing for your final research papers. Students will be asked to bring to lab section one paper per week that is of particular interest to them.

c. Course Assignments and Projects:

Assignments (e.g., homework, field reports) should be handed in on time. Late assignments will only be accepted that calendar week and will automatically receive one letter grade lower.

Homework: The assignments will include working on graphing, reading, and writing and will be directly related to material presented in class.

Local Field Trips: These trips are designed to introduce students to teach basic concepts needed for understanding field sampling for stable isotope ecology. We will be doing our sampling at UC Merced's Vernal Pool and Grasslands reserve, which is adjacent to campus.

Quizzes: Quizzes will given every other week. Students will be responsible for creating, grading, and discussing one quiz. Subject matter will relate to the topics that we discussed the previous week.

Exams: In lieu of exams, students are required to write two research papers.

1. The first paper ("*Elements*" Paper) will be written by each student and submitted in stages prior to final submission prior to the last day of class. Students will chose one element and write a 10-15 page paper on how that isotopic system works, in particular, how stable isotopes might be used to solve a problem in her/his field of interest.

- a. Ideas for papers are due at the end of Week 5.

- b. Outlines or notes on the content of the papers are due during Week 9.
- c. The first draft is due on Week 12.
- d. The 2nd draft is due on Week 14.
- e. Final submission is due on the end of class by 12 midnight.

2. The second paper is a group effort and designed to teach you how to manipulate real isotope data. We will be collecting data on the Vernal Pools and Grasslands ecosystem. Early in the class we will form research subgroups, go through all of the steps in writing a paper. *A complete draft of the paper is due by the end of class.*

- d. **Grading:** Your final grade will be based on a total of 1100 points: class participation (100 points: attendance, discussion frequency), quizzes (160 points) lab and field participation (200 points), individual "Element" paper (340 points); group research paper (300 points). This course is designed for motivated students, and it is expected that each student will complete all assignments and be responsible for engaging in the activities.

V. **Academic Integrity:** Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty.

- a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy (<http://studentlife.ucmerced.edu/what-we-do/student-judicial-affairs/academicy-honesty-policy>). Any work submitted by a student in this course for academic credit will be the student's own work or clearly identified group work.
- b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied *will both automatically receive a zero for the assignment.*
- c. Take responsibility for honorable behavior. Make every effort to prevent and avoid academic misconduct, and report acts of misconduct.
 - Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source.
 - Know the rules --- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. Requests for academic accommodations are to be made during the first 3 weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services

Center to verify their eligibility for appropriate accommodations. The instructor will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please speak with the instructor during the 1st week of class regarding any potential academic conflict.


	Weekly Topic & Learning Goals	Key Learning Outcomes	Readings	Assessments
1	Introduction to the Class and Logistics	Start to use key terms for describing stable isotope systematics	Chapter 1	
2	Carbon isotope fractionation in plants	Carbon isotopes in plants and the atmosphere	Chapter 2; Various papers	
	Carbon isotope fractionation in plants, cont.	C3, C4, and CAM Plants, Ecophysiology and carbon isotopes	Tu and Dawson; Pataki et al.	Quiz #1: Volunteer needed.
3	Nitrogen and carbon isotope in food webs	Combining stable isotope systems	Chapter 3; Chapter 4; Chapter 5; Various papers	
	Nitrogen and carbon isotopes in food webs, cont.	Constructing basic food webs	Chapter 9	Quiz #2: Volunteer needed
	First Field trip to VP/GL Reserve; Date to be determined	Understand the scope of a field collection for isotope analysis		
4	Principles of chemistry and physics	Understanding of physical and chemical processes; Equilibrium and kinetic fractionation	Sharp Chapters 1 and 2	
	Principles of chemistry and physics, cont.	Cont.		Quiz #3: Volunteer needed.
5	Hydrogen isotopes systematics	Understand how stable hydrogen isotopes are used to understand the hydrological cycle	Clark and Fritiz; Faure O and H; Hoefs Hydrosphere;	
	Hydrogen isotopes in food web studies	Understand how stable isotopes are used in food web studies	Chapter 6; various papers	
	2 nd Field Trip to VP/GL Reserve; Date to be determined	Begin field collection and sampling design.		
	Ideas for individual paper due (CROPS)			Research paper ideas due on CROPS
6	Graphing and data analysis	Using data files from other studies, learn how to make graphs that showcase results; understand variation	Various papers	
	Graphing and data analysis, cont.	Use R to create food web models.	Chapter 13	Quiz #4, volunteer needed.
7	Measurements and Gear	Understand how an isotope ratio mass spectrometer works	Encyclopedia of Mass Spec Chapters	
	Measurements and Gear, cont.	Understand how an elemental analyzer, GC-Combustion system works		Quiz #5; Volunteer needed
	Laboratory Sample prep			
8	Oxygen isotopes in hydrology, carbonates	Understand oxygen isotope systematics in water and inorganic materials	Sharp Chapters 4 and 6	
	Oxygen isotopes in plants, animals		Chapter 11	
	3 rd Field to Reserve: Date to be determined.	Continue to develop sample collection and ancillary measurements		
9	Analytical Issues	Precision vs. Accuracy; Isotope standards; How to determine biological vs. analytical variation	Sharp Chapters 1 and 2; various papers	
	Sample Preparation #2	Learn how to preserve and collect samples		Quiz #6; Volunteer Needed.

	Weekly Topic & Learning Goals	Key Learning Outcomes	Readings	Assessments
	Individual "Element" paper outline			Outline and notes for paper (CROPS)
10	Review and sample preparation			
11	Physiology and Biochemistry	Learn the molecular basis for isotope fractionation	Various papers	
	Physiology and Biochemistry, cont.			Quiz #7: volunteer needed
	Preparation of VP/GL reserve samples			
12	Compound Specific Isotope Analysis	Learn about lipid analyses	Chapter 14	
	Compound Specific Isotope Analysis, cont.	Learn about amino acid analyses	Popp et al Tuna	Quiz #8: volunteer needed
	4 th field trip to VP/GL Reserve: Date to be determined			
	1 st Draft of Element paper due (CROPS)			1 st draft of Element paper (CROPS)
13	1Sulfur isotope systematics	Understand sulfur isotope systematics	Chapter 8; various papers	
	Trophic discrimination			Quiz #9; volunteer needed.
	Isotope analytical sessions			
14	1 st Discussion on analyzing VP/GL data	Learn first hand data analysis		
	Forming a research paper	Discuss introduction, methods, etc.; Develop the outline and determine writing assignments: Introduction, Methods, Field Area, Results, Discussion, Literature review		Outline for VP/GL Collaborative Paper (CROPS); Writing assignments
	Independent field trip or analytical session(s) as needed: Date to be determined			
	Revised Elements paper due (CROPS)			Revised Elements Paper
15	Isotopes and Astrobiology	5 Minute Talks on how you would incorporate stable isotopes into your own research	Various papers	3-Powerpoint slides per person
	Strontium Isotopes	5 Minute Talks on how you would incorporate stable isotopes into your own research		1 st Draft of VP/GL writing assignments due
	Independent field trip or analytical session(s) as needed: Date to be determined			
16	2 nd Presentation of VP/GL research	How to present original research		Prepare Powerpoint presentation to the class

	Non-traditional stable isotopes	Calcium, Iron, Magnesium, Mercury isotopes in biological systems		Quiz #10
	Independent field trip or analytical session(s) as needed: Date to be determined			
17	Final Elements paper due (CROPS)	Literature review and synthesis		Individual Paper
	Complete Revised Draft VP/GL Research Paper	Original research paper		Group Paper

ESS 047: Astrobiology

Course Title	Astrobiology
Abbreviated Course Title	Astrobiology
Course Subject	ESS
Course Number	047
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	
Prerequisites	
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Astrobiology refers to the study of the origin and evolution of life in the cosmos: What is life, how did it form, and where is it? It is an integrative, multidisciplinary field that includes areas of astronomy, biology, (bio)chemistry, geology, and physics.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course
Brief Explanation of Change(s)	This replaces current upper level Astrobiology BIO-147 and ESS-147. The new, lower level course would fulfill a GE science requirement for SSHA students, and is an elective lower division science course for SNS and SOE students.
Total Contact/Non-contact Hours Per Week	Lecture: 3 contact, 6 non-contact Lab: 0 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 1 contact, 2 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	60
Maximum Enrollment Reason	----
Cross-listing	BIO 047
Conjoined	
Cross-listed Schools	Natural Sciences

Can this course be repeated?	No
How many times?	
Resource Requirements	TA for 1 hour discussion sections
Does this satisfy a General Education Requirement?	Yes
Course Outline and/or Additional Documentation	 AstroBio-S14-Syllabus-May31.doc.pdf (192Kb)

University of California, Merced
ASTROBIOLOGY
Spring 2014 – BIO/ESS 147 – CRN # 4171 / 4261

Academic Calendar Spring Semester 2014

Martin Luther King Jr. Holiday	Monday	January 20, 2014
Spring Instruction Begins	Tuesday	January 21, 2014
Presidents Day Holiday	Monday	February 17, 2014
Spring Recess	Monday - Thursday	March 24 - 27, 2014
Cesar Chavez Holiday	Friday	March 28, 2014
Instruction Ends	Friday	May 9, 2014
Final Exam, Astrobiology	Friday, 11:30 am – 2:30 pm CLSSRM 282	May 16, 2014
Spring Semester Ends	Friday	May 16, 2014
Final Grades Due	Tuesday at Noon	May 20, 2014

Syllabus, Spring 2014

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Lecture: Tue & Thu 01:30-02:50 pm, CLSSRM 282
Discussion: Wed 02:00-02:50 pm, CLSSRM 129
 4 units (3 hours of lecture and 1 hour discussion)

Instructor: Dr. Wil van Breugel
wvanbreugel@ucmerced.edu, ph. 209-228-4686 (College One office)
 Office hours: by appointment

Teaching Assistant: Debra Conte – dconte@ucmerced.edu - AOA 161 (contact her for office hours)

Course Description:

Astrobiology refers to the study of the origin and evolution of life in the cosmos: What is life, how did it form, and where is it? It is an integrative, multidisciplinary field that includes areas of astronomy, biology, (bio)chemistry, geology, and physics. After a brief review of how humans have attempted to address these questions in the past we will look at the foundations on which modern astrobiology is built:

- Our deep connection to the cosmos
- The formation and evolution of planets like Earth
- The key physical, chemical and biological processes that may help us understand the origin and evolution of life
- How life survives in extreme environments
- The search for extraterrestrial life in our solar system and elsewhere
- Ethical considerations of astrobiology related research and exploration, and of potential encounters with extraterrestrial intelligent life forms

The lectures are put together from a variety of textbooks and conference proceedings, as well as some popular (but decent) science books. A few of the lectures are cobbled together from

various other sources, including previous lectures by Prof. Monica Medina (prev. UCM), and Prof. Imke de Pater (UCB)

I will loosely follow the textbook, with updated material where needed:

PLANETS & LIFE: THE EMERGING SCIENCE OF ASTROBIOLOGY

Ed. by Woodruff T. Sullivan III & John A. Baross

Cambridge University Press; 2007; ISBN 978-0-521-53102-3 paperback

Chapters and information from some other books used are:

ON PLANETARY EVOLUTION

Planetary Systems and the Origin of Life

Ralph Pudritz, Paul Higgs & Jonathon Stone, Eds.

Cambridge University Press; 2007; ISBN 978-0-521-87548-6 hardback

and also

Extrasolar Planets and Astrobiology

Caleb Scharf

University Science Books; 2009; ISBN 978-1-891398-55-9 hardback

ON WATER

Water and Life: The unique properties of H₂O

R.M. Lynden-Bell et al., Editors

CRC Press; 2010; ISBN 978-1-4398-0356-1 hardback

ON BIOTHERMODYNAMICS

Biological Thermodynamics

Donald T. Haynie

Cambridge University Press; 2 edition (March 10, 2008); ISBN 978-0-521-71134-0 paperback

See also <http://www.biologicalthermodynamics.com/index.htm>

ON ORIGINS OF LIFE

Singularities

Christian de Duve

Cambridge University Press; 2009; ISBN 978-0-521-84195-5 hardback

and also

Fitness of the Cosmos for Life

J.D. Barrow, S.C. Morris, S.J. Freeland & C.L. Harper, Eds.

Cambridge University Press; 2008; ISBN 978-0-521-87102

ON SYNTHETIC BIOLOGY

Life in the Universe ... and the Scientific Method

Steven A. Benner

The FfAME Press; 2009; ISBN 978-0-615-26745-6 paperback

ON ASTROBIOLOGY AND ETHICS

Encountering Life in the Cosmos:

Ethical Foundations and Ethical Implications of Astrobiology

C. Impey, A.H. Spitz & W. Stroeger, Editors

The University of Arizona Press; 2013; ISBN 978-0-8165-2870-7 paperback

An important book of historical interest, and which might be considered the beginning of the scientific search for the origin of life is by the quantum mechanics physicist Edwin Schrodinger:

What is Life?, Mind and Matter, and Autobiographical Sketches

E.dwin Schrodinger (based on lectures given 1944 and 1958)

Cambridge University Press; 2004; ISBN 0-0521-42708-8 paperback

Learning Objectives (instructor will):

- Introduce students to a broad spectrum of natural sciences
- Cultivate intellectual curiosity about the origin and evolution of planets and of life
- Show how different science disciplines are needed to approach such a complex problem as the origin of life
- Demonstrate interdisciplinary analytical thinking, problem-solving, decision-making, and ethical considerations
- Review effective strategies for learning and presenting

Learning Outcomes (students will be able to):

- Organize and assess information from a variety of natural science disciplines
- Understand the value of interdisciplinary sciences for developing new, forefront science directions
- Appreciate the value of a new interdisciplinary science such as astrobiology for broad, general science education
- Apply what they have learned by presenting case studies of astrobiological topics of their choice

Procedures and Guidelines:

Lectures: This course is multi-disciplinary and fast-paced, with nearly every lecture devoted to new ideas. **It is imperative that students come to class and attendance will be taken.** Not keeping up will put you hopelessly behind. During the lecture students are expected to take notes; and are also asked to write down questions on index cards that can be picked up at the beginning of class and dropped off at the end of class. We will discuss some of these questions during class and / or in the discussion sections. The below 5 questions can serve as a general guide:

Reflection on learning

1. Which of the concepts presented in class are difficult for you?
2. What was the key concept today?
3. What else would you like to know about the topic?

Critical thinking

4. Describe a connection between today's lecture and recent news issues (science, technology, politics, economic, etc.)
5. Describe how your own personal background and thinking (cultural, ethnic, education, religion, experience, gender) may affect your interpretation of the material presented today

Discussion Sections: The TA will determine how the discussion sections will be conducted.

Panel Discussion: If time permits there may be a panel discussion during the semester. Students will be assigned a topic to discuss, as well as a position of for or against. This will provide a review of the material discussed in the lecture and the discussion, as well as allow students to formulate opinions on present topics in Astrobiology.

Course Requirements:

- Class participation and attendance: Attendance will be taken for both class and the discussion sections
- Required readings: Lecture slides
- Course readings: Some chapters of books covered in the lectures
- Course assignments and projects: To be determined

Midterms & Final: You will be given three midterm and a final exam. The midterms will be in class exams. No make-up exams will be given unless there are exceptional circumstances justified by the appropriate documentation. Students who have a documented reason (such as a religious observance or scheduling conflict with another exam) may request to take the midterm exam *at a different time* the scheduled exam time.

Grading: Your learning will be assessed as follows:

15%	midterm 1
15%	midterm 2
15%	midterm 3
20%	discussion and participation (this includes being present at all lectures and discussion sections)
20%	student presentation and report
15%	final exam

Exam regrading: Midterm exams may be submitted for regrading if the student believes that errors were made in the grading. Requests for regrading must be made within a week of the exam being returned. Exams submitted for regrading will be completely regraded, so that the resulting grade may be higher or lower than the original grade.

Student presentation/report: You will be expected to work in groups of 2 or 3 and choose a topic of relevance to astrobiological research. It can come from topics discussed in class but your presentation should go into more depth and provide new insight from the most recent literature in *peer reviewed journals*. You are welcome to discuss your topic of choice with your instructors and T. A. Your presentation will be 15 minutes long. Your report has to be at least 3,000 words, excluding figure legends and references. The presentations will be judged following an oral presentation rubric (attached). Work (such as a powerpoint slide) prepared by each individual in a group must be labeled as such.

Academic integrity: Academic honesty is a core value of the University of California and the central rule of academic honesty is that you must do your own work. While it is acceptable to work in groups to study, it is completely unacceptable to receive assistance of any kind on exams. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* and is available via the UCMCROPS site

(<http://studentlife.ucmerced.edu/2.asp?uc=1&lvl2=121&lvl3=121&lvl4=123&contentid=171>). For additional information visit (<http://studentlife.ucmerced.edu/>).

Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct that you witness.
- Know the rules -- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Astrobiology Websites:

<http://astrobiology.nasa.gov/> (U.S.A.)

<http://www.astrobiologysociety.org/> (U.K.)

<http://en.wikipedia.org/wiki/Astrobiology>

<http://www.astrobiology.com/>

Astrobiology Journal:

<http://online.liebertpub.com/loi/ast>

Astrobiology Books:

“Encountering Life in the Universe: Ethical Foundations and Social Implications of Astrobiology”, 2013. Eds. Chris Impey, Anna H. Spitz, and William Stoeger, University of Arizona Press. ISBN 978-0-8165-2870-7.

“Water and Life: The unique properties of H₂O”, 2010. Ed. Ruth M. Lynden-Bell, Siman Conway Morris, John. D.Barrow, John J. Finney, and Charles L. Harper, Jr. CRC Press. ISBN 978-1-4398-0356-1. hardcover

“Extrasolar Planets and Astrobiology”, 2008. Caleb A. Scharf. University Science Books. ISBN-10 1891389556 / ISBN-13 978-1891389559. hardcover

“Fitness of the Cosmos for Life”. 2008. Ed. John D. Barrow, Simon Conway Morris, Stephen J. Freeland & Charles L. Harper, Jr. Cambridge University Press. ISBN 978-0-521-87102-0. hardcover

“Life in the Universe: Expectations and Constraints”, Second Edition 2008. Dirk Schulze-Makuch & Louis N. Erwin. Springer Verlag. ISBN 978-3-540-76816-6. hardcover

“Planets and Life: The emerging science of astrobiology”, 2007. Ed. Woodruff Sullivan & John Baross. Cambridge University Press. ISBN 978-0-521-82421-7.

“Planetary Systems and the Origins of Life”, 2007. Ed. By Ralph Pudritz, Paul Higgs & Jonathan Stone. Cambridge University Press. ISBN 978-0-521-87548-6. hardcover

“Complete Course in Astrobiology”, 2007. Ed. by G. Horneck & P. Rettberg. Wiley-VCH. ISBN 978-3-527-4-660-9.

“Life in the Universe”, 2007. J. Bennett & S. Shostak. Pearson Education Inc. ISBN 0-8053-4753-4.

“Astrobiology”, 2006. Kevin W. Plaxco & Michael Gross. The Johns Hopkins University Press. ISBN 0-8018-8367-9.

“Astrobiology: A Multidisciplinary Approach”, 2005. J.I. Lunine. Pearson Education Inc. ISBN 0-8083-8042-6.

“Singularities”, 2005. Christian de Duve. Cambridge University Press. ISBN 978-0521-84195-5. hardcover


“Life in the Universe: From the Miller Experiment to the Search for Life on other Worlds”, 2004. Ed. by J. Seckbach, J. Chela-Flores, T. Owen & F. Raulin. Kluwer Academic Publishers. ISBN 1-4020-3093-2.

“Chemical Evolution and the Origin of Life”, 2008 (original German version 2004). Horst Rauchfuss. Springer Verlag. ISBN 978-3-540-78822-5 hardcover

“Astrobiology: The Quest for the Conditions of Life”, 2001. Ed. by G. Hornbeck & C. Baumstark-Khan. Springer-Verlag. ISBN 3-540-42101-7

CHEM 008L: Principles of Organic Chemistry Lab

Course Title	Principles of Organic Chemistry Lab
Abbreviated Course Title	Prin of Org Chem Lab
Course Subject	CHEM
Course Number	008L
School Submitting Request	Natural Sciences
Division	Lower Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	1
Upper Unit Limit	
Prerequisites	Chemistry 10 with a grade of C- or better, OR Chemistry 2 with a grade of A- or better
Prerequisites with a Concurrent Option	CHEM 008
Corequisites	
Major Restrictions	
Class Level Restrictions	
Course Description	Molecular shapes and charge distributions; resonance; electron delocalization; organic structures, nomenclature and isomerism, stereochemistry; optical activity; organic reactions; IR spectroscopy; intermolecular forces. Rational approaches to organic mechanism are emphasized.
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course Create separate lab course to allow student who fail Chem008 to not have to repeat the lab portion OVERRIDE CONTACT HOURS: Course should have 1 lecture hour and 3 lab hours for a total of 4 hours, Senate Reg 760 sets a minimum but not an absolute maximum of contact hours for a 1 unit course.
Brief Explanation of Change(s)	Lecture: 0 contact, 0 non-contact Lab: 3 contact, 0 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Contact/Non-contact Hours Per Week	
Total Hours Per Week	3
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	20
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	

Cross-listed Schools	----
Can this course be repeated?	No
How many times?	0
Resource Requirements	Requires an instructor/laboratory coordinator to prepare solutions and materials needed for each lab. One (1) 50% TA for two lab sections of 20 students each. IT support and access to computer laboratory for hands-on computer assignments, IT support will be needed in setting up and maintaining a course WWW Portal; IT support will be needed in making some interactive course material available on the WWW
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 Writing an Organic Chemistry Lab Report.pdf (283Kb)

Writing an Organic Chemistry Lab Report

Components of a Laboratory Notebook

The following components should be contained for each experiment, along with any additional material required by your instructor.

- Title and date
- Introduction (purpose, reaction)
- Physical data (including calculations)
- Procedure outline
- Data and observations
- Discussion of results (conclusions)

Prelab

Title and Date

Give the title of the experiment and the date on which it is done.

Introduction

In a sentence or two, state the purpose of the experiment. If the experiment is a preparative experiment, the introduction also includes the balanced equation for the reaction.

In organic chem, there are different types of experiments: **technique** and **preparative**.

A **technique** experiment is one in which you are performing a technique for the first time and studying its details, for example, distillation and extraction.

A **preparative** experiment is one in which a compound is synthesized from other reagents.

Physical Data

List the molecular weight, melting point, boiling point, density, solubility, and hazards of all pertinent chemicals used in the experiment. You can find this information in the CRC Handbook of Chemistry and Physics. Or, you can find the information on the Internet (see: [Hazard and Physical Data for Compounds](#) page). **Chemfinder.com** is an excellent site to find this data. The physical data are most conveniently presented in tabular form, although in a preparative experiment you may put the amounts of reactants and products under the balanced equations for the reaction.

Calculate the amounts of reactants (or compounds to be purified) in moles and grams or mL (as applicable). In a preparative experiment, calculate the **limiting reagent** (the one used in lowest molar amount) and the theoretical yield of the product. Be sure to include your calculations for these values.

When using two or more reactants in specific proportions report the **mol equivalents** of all reactants relative to the limiting reagent (Mol equivalent = moles of reactant / moles of limiting reagent). Reactants used in excess will have mol equiv > 1. Catalysts (reagents that are not consumed and therefore not limiting reagents) may be used at mol equiv < 1. You do not need to calculate moles of materials used as solvent or as auxiliaries (e.g. drying agents, decolorizing agent). Just report the amounts used in mL or grams. It is sometimes acceptable to approximate quantities, as in “added about 2 gms of sodium sulfate as drying agent” or “decolorized with activated charcoal measured on the tip of a spatula”.

Procedure

Briefly summarize the procedure to be followed, preferably either as an outline or as a flow chart. **You do not need to write out the procedure in complete sentences and do not copy directly from the Lab Manual.** All you need is a brief but complete listing of what you plan to do in the lab. The first time you do a technique such as distillation, include in the procedure section a description of how to assemble the apparatus and how to conduct the distillation. In later experiments, it will be sufficient to state only that the liquid was distilled.

Data and Observations

Your observations of the experiment as it progresses are important, new information. Write these observations (color changes, appearance of crystals, formation of an emulsion, boiling temperatures, test results, etc.) in your notebook as you do the experiment. Also record the weights of reagents and products and tare weights in this section.

In general, you do not need to re-write the Procedure section in these observations, instead, you may state that “the procedure was carried out as planned” or “the procedure was carried out as planned except” At times, however, you may have to write the procedure out partially. For instance, if you state “the solution turned green,” you will have to write out enough of the procedure so that your instructor will know at what step in the reaction the solution turned green. As a guideline, consider that from the procedure and data and observations sections, any chemist should be able to duplicate your experiment. With this in mind, be thorough but include only pertinent information.

Discussion of Results

This is the section in which you interpret the data obtained in the previous section. For instance, indicate the amount of purified compound that you obtained and how the purity and identity of the compound was assessed. In a preparative experiment, state the percent yield. Include and/or discuss instrument printouts, such as GC traces and IR spectra (if you have them). In this section, you can state whether or not the procedure was a good method for making the desired compound; if not, try to make suggestions to improve the method for future experimenters. Be sure to include a discussion of possible sources of error, and how that error would affect the overall yield.

In general you should NEVER report a yield greater than 100%. If the mass obtained from a reaction would suggest a yield that exceeds 100% you must assume that impurities are present (such as excess reagents, salts, solvent, water, etc.). Try to explain in the discussion what impurities might account for the extra mass and why they are present. You can also suggest additional purification steps for their removal.

Sample Lab Report

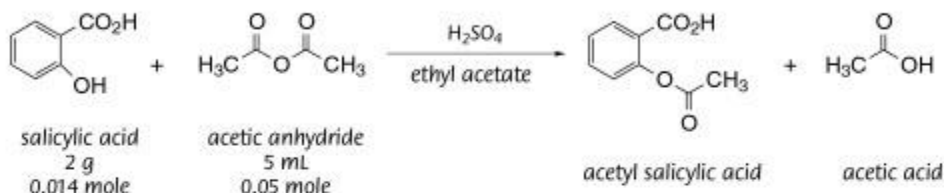
The next 4 pages show a sample preparative organic chemistry lab report. You do not need to include the header and footer on each page. However, you should include the information in the header on the first page.

Adapted from <http://orgchem.colorado.edu/hndbksupport/labnb/labnb.html>

EXP. NUMBER 1	EXPERIMENT/SUBJECT Organic Chem 2 Lab	DATE 2/29/00	1
NAME John Doe (TA: Gregg N. Yard)		LOCKER NO. 55	COURSE & SECTION NO. chem 3341-111

The Preparation of Aspirin

The purpose of this experiment is to synthesize aspirin (acetyl salicylic acid) from salicylic acid and acetic anhydride.



The limiting reagent is salicylic acid. The theoretical yield of acetyl salicylic acid is 2.52 g.

Physical Data:*

	MW	mp	bp	density	solubility	hazards
salicylic acid	138	157-9°	—	—	al, eth, ace	toxic
acetyl salicylic acid	180	135-6°	—	—	al, eth, chl	irritant
acetic anhydride	102	—	138°	1.08	—	corrosive, lachrymator
acetic acid	60	—	117-8°	1.049	—	corrosive
sulfuric acid	98	—	—	1.84	—	corrosive
ethyl acetate	88	—	77°	0.90	—	flammable

*Data from the CRC, 70th ed.

Calculations:

2 g salicylic acid (1 mole/138 g) = 0.014 moles

5 mL acetic anhydride (1.08 g/mL) = 5.4 g then,

5.4 g (1 mole/102 g) = 0.05 moles

thus salicylic acid is present in the lesser molar amount and is the limiting reagent

therefore the theoretical yield of acetyl salicylic acid is 0.014 moles, or

0.014 moles (180 g/mole) = 2.52 g

Procedure

From: Experiments for Organic Chemistry, Chem 3341, Spring 2000, pp. 20-25

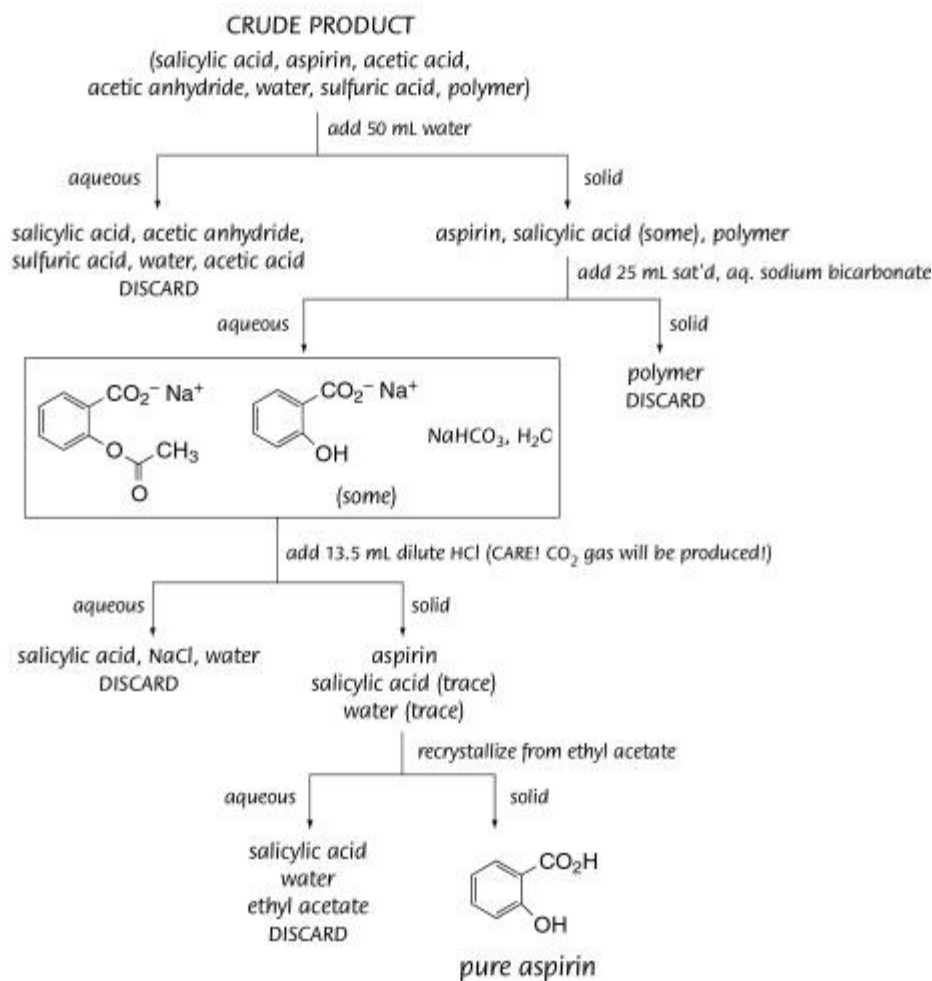
- 1) Mix salicylic acid and acetic anhydride in a 125 mL Erlenmeyer flask, add 5 drops H₂SO₄.
- 2) Heat on steam bath for 10 min, then cool.
- 3) Add 50 mL water and cool on ice.
- 4) Collect product by vacuum filtration.
- 5) Air dry the crude product crystals and determine a crude yield.
- 6) Purify as in the flow chart below on the next page.

SIGNATURE John Doe	DATE 2/29/00
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EXP. NUMBER 1	EXPERIMENT/SUBJECT Organic Chem 2 Lab	DATE 2/29/00	2
NAME John Doe (TA: Gregg N. Yard)		LOCKER NO. 55	COURSE & SECTION NO. chem 3341-111

The Preparation of Aspirin (con't)

6) Continued: flow chart for purification of crude product.



SIGNATURE John Doe	DATE 2/29/00
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EXP. NUMBER 1	EXPERIMENT/SUBJECT Organic Chem 2 Lab	DATE 2/29/00	3
NAME John Doe (TA: Gregg N. Yard)		LOCKER NO. 55	

The Preparation of Aspirin (con't)

Data and Observations

wt of salicylic acid + paper: ~~2.30 g~~ 2.43 g

wt of paper: 0.43 g

salicylic acid: 2.00 g

- 1) On mixing, it took a few minutes for everything to go into solution. The addition of sulfuric acid caused some fizzing.
- 2) Heated for about 15 min instead of the planned 10 min.
- 3) After adding the water and cooling, no crystals appeared. On the suggestion of my TA, I scratched the flask with a glass rod, chilled it on ice for 10 more min, and finally a lot of slightly tan crystals appeared.
- 4) Quite a lot of solid, lightly tan, was collected on the filter paper
- 5) Let dry for 10 min.

crude product + watchglass: 32.02 g

watchglass: 30.10 g

crude product: 1.92 g

% yield of crude product: $1.92 \text{ g} / 2.52 \text{ g} = 76\%$

mp = 125-129°

- 6) When I followed the scheme in the flow chart for purification of the crude product, I noticed that when I added the sodium bicarbonate, the product turned yellow. I suspected a contaminated (dirty) beaker. So, I treated the mixture with Norite pellets. A clear solution resulted. The purification scheme was followed without mishap through the recrystallization from ethyl acetate.

crude product + watchglass: 31.80 g

watchglass: 30.10 g

crude product: 1.70 g

% yield of crude product: $1.70 \text{ g} / 2.52 \text{ g} = 67\%$

mp = 133-135°

Conclusion

The yield of purified aspirin was 1.70 g or 67% yield. Although an acceptable value, future experimenters could take steps to better the yield, perhaps by running the reaction for longer than 15 min to encourage more product formation, or by more carefully rinsing the flask when transferring crystals. Also, some product may have been (con't)

SIGNATURE John Doe	DATE 2/29/00
-----------------------	-----------------

EXP. NUMBER 1	EXPERIMENT/SUBJECT Organic Chem 2 Lab	DATE 2/29/00	4
NAME John Doe (TA: Gregg N. Yard)		LOCKER NO. 55	

The Preparation of Aspirin (con't)

Conclusion (con't)


lost by the Norite step (added to remove the colored contaminant). I'd suggest carefully checking the cleanliness of all glassware before beginning the purification step to eliminate the need for this step and thus to improve yield.

The wide range and low value of the mp of the crude product indicates that before recrystallization, the aspirin was not very pure. After recrystallization, the small mp range of aspirin (133-135°) indicates a pure compound. This value correlates well with the literature value (135-136°) for the mp of aspirin. From this data, it is likely that the compound isolated is aspirin, although further tests such as mixed melting points and spectroscopic data would be required to prove that it is aspirin.

SIGNATURE John Doe	DATE 2/29/00
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CHEM 160: Introduction to Scientific Computing

Course Title	Introduction to Scientific Computing
Abbreviated Course Title	Intro to Scientific Computing
Course Subject	CHEM
Course Number	160
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	3
Prerequisites	Math 22 or Math 32 or permission of instructor.
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	Junior and senior class.
Course Description	Teaches the tools and principles of scientific computing, covering the Linux operating system, programming tools and editors, shell scripting, data analysis using R, and scientific programming using interpreted and compiled languages. Course involves interactive lecture/laboratory sessions where students will gain experience doing scientific computing on both local and remote computers.
TIE Code	T: Laboratory-Skills/Techniques
Reasons for Request	New Course
Brief Explanation of Change(s)	Chem 160 is being added as a conjoined course with Chem 260 which was first offered in fall 2013. A number of chemistry undergraduate students heard about Chem 260 and asked if an undergraduate component could be added to the course.
Total Contact/Non-contact Hours Per Week	Lecture: 0 contact, 0 non-contact Lab: 4 contact, 5 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	9
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	30
Maximum Enrollment Reason	----
Cross-listing	
Conjoined	Chem 260

Cross-listed Schools	Natural Sciences
Can this course be repeated?	No
How many times?	
Resource Requirements	Requires access to a Linux teaching lab (SE 100 or SE 138).
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 CHEM 260 and 160 CRF merged.pdf (1843Kb)



Chemistry and Chemical Biology
University of California, Merced
5200 N. Lake Road
Merced, California 95343
Voice: (209) 228-4309 Fax: (209) 228-4060

March 2, 2015

TO: Kathleen Hull, Chair, Graduate council

FROM: Erik Menke, Chair, Chemistry and Chemical Biology Graduate program

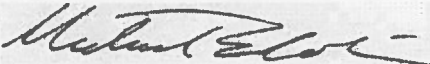
RE: Proposed changes to graduate course CHEM 260

The Chemistry and Chemical Biology (CCB) Graduate Program's Educational Policy Committee has approved the requested changes to CHEM 260, "Introduction to Scientific Computing".

School of Natural Sciences
University of California, Merced
Merced, CA 95344

February 17, 2015

To: UC Merced Graduate and Research Council

From: Michael Colvin 
School of Natural Sciences

Subject: Increasing scheduled lecture/lab time and conjoining Chem 160 and Chem 260

In the attached CRF I am proposing two changes to Chem 260, "Introduction to Scientific Computing", which was first offered in fall 2013. Although the course got good student evaluations (6.7/7.0 overall average on the numerical ratings), I believe that by having the lecture/lab sessions scheduled for only 75 minutes, the class was excessively challenging to students who had little previous experience working in a Linux computing environment. Therefore, I'm requesting that the lab sessions be increased to 100 minutes per lab session, for a total of 4 student contact hours per week. Since the additional time in class will offset time previously needed outside of class, I'd like to maintain the graduate course at 3 units.

The popularity of Chem 260 when it was taught in fall 2013 led to a several undergraduate chemistry majors asking me if this could be offered as an upper division chemistry course. I believe that this course could work well for motivated upper division students. The one undergraduate student who took Chem 260 in fall 2013 received an "A+". In order to adapt this conjoined course to the needs and interests of undergraduate students, the number of required research programming projects for Chem 160 will be 2 instead of the 5 required for the graduate students in Chem 260. I have already submitted the online CRF to create Chem 160.

University of California Merced Graduate Course Request Form

Group Submitting Request

Chemistry and Chemical Biology

1. Course Number

Chem 260

Full Course Title:

~~Scientific Computing~~

Introduction to Scientific Computing

Abbreviated Course Title:

~~Scientific Computing~~

Intro to Scientific Computing

Effective Date

Fall 2015

~~April 2015~~

Discontinue Date

Number of Units:

3

(Each unit should correspond to an average of 3 hours of student effort per week. For courses with nonstandard formats, justification for the number of units should be provided.)

2. Pre-requisites:

3. Are there co-requisites for the course?

No

If "yes" please list:

4. Is this course to be taken concurrently with another course?

No

If "yes" please list:

5. Is this course restricted to certain graduate groups?

No

If "yes" please list:

6. Course Description

Limited to 50 words

Teaches the tools and principles of scientific computing, covering the Linux operating system, programming tools and editors, shell scripting, data analysis using R, and scientific programming using interpreted and compiled languages. Course involves interactive lecture/laboratory sessions where students will gain experience doing scientific computing on both local and remote computers.

7. Reason for request

New Course:

Suggested #:

Chem 260

Attach brief course outline

Course Modification (check all that apply)

Hours per week:

Grading Options:

New Course Number :	<input type="text"/>	Lecture:	<input type="text" value="4"/>	Grad Student Grading	<input type="text" value="Letter grade Only"/>
New Title :	<input type="text"/>	Seminar:	<input type="text"/>		
New Description :	<input type="text"/>	Discussion:	<input type="text"/>		
Unit Change :	<input type="text"/>	Lab:	<input type="text"/>		
Pre Req Change :	<input type="text"/>	Tutorial:	<input type="text"/>		
Grading Option Change :	<input type="text"/>	Field:	<input type="text"/>	In Progress Grading	<input type="text"/>
Replaces Course # :	<input type="text"/>	Studio:	<input type="text"/>		
Discontinuance :	<input type="text"/>				

Brief explanation of change(s):

Increasing combined lecture/lab time to 4 hours per week and conjoining Chem 160. The course is taught in a combined lecture/lab format. The students sit at computer workstations while the instructor presents new concepts in a lecture format. As soon as each concept is described, the students work through short exercises on the computer and then the lecture resumes.

Is this course cross listed with another course?

No

If so, please list that course:

Maximum course enrollment:

20

Explanation:

Limited by the number of students a single instructor c

Is this course to be co-listed with an undergraduate course?

Yes

If so, please list that course and provide justification in cover letter:

Chem 160

9. May this course be repeated for credit?

No

If so how many times?

10. List the expected resource requirements, including personnel (TA's, etc.) library, classroom and lab space, supplies and equipment, IT requirements and transportation.

Lecture or seminar room with tables so students can work on laptop computers during the class. Classroom must be in a location where the UC Merced WiFi has a signal.

Course submitted by: Michael Colvin

Instructor proposing course

2/17/2015

Date

Approved by:

School Dean

Date

Policies & LEARNING OUTCOMES
Scientific Computing
(CHEM 260)
3 Units

INSTRUCTORS: Prof. Mike Colvin (mcolvin@ucmerced.edu)

COURSE GOALS AND OBJECTIVES:

This course teaches the tools and principles of scientific computing, covering the Linux operating system, programming tools and editors, shell scripting, data analysis using R, and scientific programming using both interpreted and compiled languages. The course will involve interactive lecture/laboratory sessions in which new concepts will be immediately applied. Students will gain experience doing scientific computing on systems ranging from laptops, to Linux clusters, to massively parallel supercomputers. All software used in the course is open-source so the tools taught will be freely available for students to use in their research.

STUDENT LEARNING OUTCOMES:

Course learning outcomes of this course are aligned with the following programmatic learning outcomes of the Chemistry and Chemical Biology program:

PLO 4. Be proficient in laboratory, theoretical, and/or computational techniques necessary to contribute to knowledge in their chosen subfield of chemistry

These learning outcomes are both embodied in the following six specific course outcomes. By the end of this course, students will be able to:

1. Use the Linux operating system for data management, analysis and programming.
2. Use scientific programming tools including scriptable editors, debuggers and revision control systems.
3. Write scripts in the R statistical programming language to analyze and plot data.
4. Write scientific programs using the interpreted programming language Python
5. Write scientific programs using the compiled programming languages
6. Effectively use queue-based remote supercomputers for running scientific simulations.

These learning outcomes map onto the class sections as follows:

Unit	Theme	Weeks	1	2	3	4	5	6
I	Computing system tools	1-2	X	X				
II	Data analysis using R	3-4			X			
III	Scientific programming in Python	5-7		X		X		
IV	Scientific programming in compiled languages	8-15	X	X			X	
V	Large scale scientific computing	10-11	X					X

GENERAL COURSE LOGISTICS

REQUIRED TEXT: There are no required textbooks for this course, but online reference materials will be posted to the course website. Students are encouraged to access additional reference materials through the UC Merced Kolligian Library, including the full text of a number of programming textbooks available through the library's electronic holdings.

COURSE WEBSITE: The CHEM 260 website is part of the UCMCROPS course management system and will be automatically available to all students enrolled in the class. This UCMCROPS site contains the course announcements; electronic copies course materials, links to online materials, supplementary readings, and various course-related announcements.

COMPUTER ACCESS: This course will require all students to have access to a computer from which they can log on to Linux servers on campus and/or on which they can install a version of Linux. Students will also get computer accounts on scientific computing systems at UC Merced and remote facilities. Students must agree to use these systems responsibly and in accordance with all relevant laws and policies.

CLASS SESSIONS: Two 100 minute combined lecture/laboratory sessions per week in the Linux Labs.

OFFICE HOURS: Two hours per week to be scheduled.

COMPUTER PROJECTS: CHEM 260 will require 5 programming projects. These projects are meant to connect each of the five themes covered in the class to the students' individual graduate research area. Examples of such project might include shell scripts to drive molecular simulations, R scripts to collect and analyze experimental data, or Monte Carlo programs to optimize a multi-step reaction process. A component of the project grade will be the students' appropriately matching the programming tools to their research problem. (In contrast, for the conjoined Chem 160, the 2 required programming projects will simply be student-chosen topics that demonstrate independent use of the programming skills covered in the course.)

HOMEWORKS AND QUIZZES: There will be approximately 20 homework assignments and 24 short online quizzes.

COURSE POINTS: Grades will be based upon points received for the projects and quizzes, based on the following scale (which may be adjusted as the course progresses).

Activity	Number	Percentage of Final Grade
Projects	5	50%
Homeworks	14	30%
Quizzes	24	20%
Total		100%

LETTER GRADES:

The final distribution of grades in CHEM 260 will depend on the overall achievement of the students in the course, but the following grades will be *guaranteed* to students achieving the indicated percentage of the total possible points in the course

Grade	% of total points achieved
A (A-, A, or A+)	Over 90%
B (B-, B, or B+)	Over 80%
C (C-, C, or C+)	Over 70%
D (D-, D, or D+)	Over 60%

Information on grade appeals, incompletes, etc. can be found at the end of this document and in the *UC Merced Grading Policy* available from the Registrar (<http://registrar.ucmerced.edu/policies/grades>).

STUDENT SERVICES:

UC Merced is committed to make our courses accessible to all students, including students with limited mobility, impaired hearing or vision, and learning disabilities. Students with special needs should contact their advisor as early as possible in the semester so that appropriate arrangements can be made.

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable

accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Center: <http://disability.ucmerced.edu/>.

LATE ASSIGNMENTS:

Computational projects turned in after their due date will automatically have a fraction of the total point possible point value deducted. There will be a penalty of 25% deducted for every week after the due date and no assignments will be accepted more than 2 weeks late. The only exceptions will in the case of documented acceptable excuses.

ACADEMIC INTEGRITY:

You are not allowed to work with another person on the projects for this class. At the first instance of copied projects, a grade penalty greater than the point value of the assignment will be given to students with duplicate answers. Subsequent copied assignments may be forwarded to the Vice-Chancellor for Undergraduate Affairs and the Office for Judicial Affairs and could lead to dismissal from course or university (see section on Academic Integrity below).

Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* available from your instructor. The following general guidelines are adapted from UC Davis Code of Academic Conduct (<http://sja.ucdavis.edu/>):

Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct which you witness.
- Do not submit the same work in more than one class. Unless otherwise specified by the instructor, all work submitted to fulfill course requirements must be work done by the student specifically for that course. This means that work submitted for one course cannot be used to satisfy requirements of another course unless the student obtains permission from the instructor.
- Unless permitted by the instructor, do not work with others on graded coursework, including in class and take-home tests, papers, or homework assignments. When an instructor specifically informs students that they may collaborate on work required for a course, the extent of the collaboration must not exceed the limits set by the instructor.
- Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source. Students who are confused about whether a particular act constitutes plagiarism should consult the instructor who gave the assignment.
- Know the rules. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Chemistry 260 Introduction to Scientific Computing Syllabus, Fall 2015

Class sessions: Two 100 minute labs per week

Date	Unit	Class	Topics
	Linux I	1	Linux commands for files & directories
	Linux II	2	File & dir review, pipes, vi editor, slicing & dicing files, system commands
	Linux III	3	Screen command, Bash programming part 1
	Office hour Special topic 1	--	[Optional] Using the emacs editor
	Linux IV	4	Bash programming part 2
	Linux V	5	Bash programming part 3, scripts to drive simulations
	R I	6	Introduction to data analysis and plotting using R
	Office hour Special topic 2	--	[Optional] Emacs interface to R (ESS)
	R II	7	Statistical modeling in R using the general linear model
	R III	8	R programming, introduction to dynamics and Monte Carlo simulations
	R IV	9	Combining Bash and R scripts for scientific data analysis, PROJECT 1
	Python I	10	Overview, examples, and numbers and list data types, Ising model
	Python II	11	Python control flow, Ising model program
	Python III	12	Python functions and modules, molecular dynamics program
	Python IV	13	Overview of object oriented programming, point class, Ising model
	Python V	14	Object-oriented molecular dynamics program, variable scope and copying
	Python VI	15	Other helpful Python data types, file parsing and I/O
	C I	16	Concept of compiled languages, C/C++ overview & basic language features
	C II	17	C I/O, control statements, structures
	C III	18	C libraries, C language Ising model
	C IV	19	Functions, C language MD Simulation program
	HPC I	20	Using remote queue-based computer facilities, Gromacs MD program
	HPC II	21	Parallel computing, speed-up graphs
	C V	22	Pointers, arrays and memory management in C
	C VI	23	C string processing, file I/O, file parsing, Project 2
	C VII	24	C Command line arguments (argv), system calls
	Misc. topics	25	Installing Linux and software packages, make files.

February 26, 2015

To: Graduate Council

From: Angela Krueger, Substantive Change and Graduate Assessment Coordinator


RE: Assessment Review of New and Revised Course Syllabi

As outlined in the Graduate Course Approval and CRF Process, I have reviewed the revised syllabus for CHEM 260: Scientific Computing. From an assessment and WASC perspective, this syllabus is ready to be submitted to the Registrar.

School of Natural Sciences
University of California, Merced
Merced, CA 95344

February 9, 2015

To: UC Merced Undergraduate Council


From: Michael Colvin 
Chair, Chemistry and Chemical Biology
School of Natural Sciences

Subject: Conjoining Chem 160 with the existing Chem 260 course

In the attached CRF I am proposing that a new undergraduate course Chem 160 be conjoined with the existing Chem 260 course, "Introduction to Scientific Computing". Chem 260 was first offered in fall 2013 to a group of 16 graduate students and 1 undergraduate. The course received high student evaluations (6.7/7.0 overall average on the numerical ratings) and led to several undergraduate chemistry majors asking me if this could be offered as an upper division chemistry course. I believe that this course could work well for motivated upper division students. The one undergraduate student who took Chem 260 in fall 2013 received an "A+". In order to adapt this conjoined course to the needs and interests of undergraduate students, the number of required research programming projects for Chem 160 will be 2 instead of the 5 required for the graduate students in Chem 260.

CHEM 160: Introduction to Scientific Computing

Course Title	Introduction to Scientific Computing
Abbreviated Course Title	Intro to Scientific Computing
Course Subject	CHEM
Course Number	160
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	3
Upper Unit Limit	3
Prerequisites	Math 22 or Math 32 or permission of instructor.
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	Junior and senior class.
Course Description	Teaches the tools and principles of scientific computing, covering the Linux operating system, programming tools and editors, shell scripting, data analysis using R, and scientific programming using interpreted and compiled languages. Course involves interactive lecture/laboratory sessions where students will gain experience doing scientific computing on both local and remote computers.
TIE Code	T: Laboratory-Skills/Techniques
Reasons for Request	New Course
Brief Explanation of Change(s)	Chem 160 is being added as a conjoined course with Chem 260 which was first offered in fall 2013. A number of chemistry undergraduate students heard about Chem 260 and asked if an undergraduate component could be added to the course.
Total Contact/Non-contact Hours Per Week	Lecture: 0 contact, 0 non-contact Lab: 4 contact, 5 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 0 non-contact Tutorial: 0 contact, 0 non-contact Field: 0 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Hours Per Week	9
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	30

Maximum Enrollment Reason	----
Cross-listing	
Conjoined	Chem 260
Cross-listed Schools	Natural Sciences
Can this course be repeated?	No
How many times?	
Resource Requirements	Requires access to a Linux teaching lab (SE 100 or SE 138).
Does this satisfy a General Education Requirement?	No
Course Outline and/or Additional Documentation	 Chem 160 CRF documents.pdf (88Kb)

Chemistry 160 Introduction to Scientific Computing Syllabus, Fall 2015

Class sessions: Two 100 minute labs per week

Date	Unit	Class	Topics
	Linux I	1	Linux commands for files & directories
	Linux II	2	File & dir review, pipes, vi editor, slicing & dicing files, system commands
	Linux III	3	Screen command, Bash programming part 1
	Office hour Special topic 1	--	[Optional] Using the emacs editor
	Linux IV	4	Bash programming part 1
	Linux V	5	Bash programming part 2, scripts to drive simulations
	R I	6	Introduction to data analysis and plotting using R
	Office hour Special topic 2	--	[Optional] Emacs interface to R (ESS)
	R II	7	Statistical modeling in R using the general linear model
	R III	8	R programming, introduction to dynamics and Monte Carlo simulations
	R IV	9	Combining Bash and R scripts for scientific data analysis, PROJECT 1
	Python I	10	Overview, examples, and numbers and list data types, Ising model
	Python II	11	Python control flow, Ising model program
	Python III	12	Python functions and modules, molecular dynamics program
	Python IV	13	Overview of object oriented programming, point class, Ising model
	Python V	14	Object-oriented molecular dynamics program, variable scope and copying
	Python VI	15	Other helpful Python data types, file parsing and I/O
	C I	16	Concept of compiled languages, C/C++ overview & basic language features
	C II	17	C I/O, control statements, structures
	C III	18	C libraries, C language Ising model
	C IV	19	Functions, C language MD Simulation program
	HPC I	20	Using remote queue-based computer facilities, Gromacs MD program
	HPC II	21	Parallel computing, speed-up graphs
	C V	22	Pointers, arrays and memory management in C
	C VI	23	C string processing, file I/O, file parsing, Project 2
	C VII	24	C Command line arguments (argv), system calls
	Misc. topics	25	Installing Linux and software packages, make files.

Policies & LEARNING OUTCOMES
Scientific Computing
(CHEM 160)

INSTRUCTORS: Prof. Mike Colvin (mcolvin@ucmerced.edu)

COURSE GOALS AND OBJECTIVES:

This course teaches the tools and principles of scientific computing, covering the Linux operating system, programming tools and editors, shell scripting, data analysis using R, and scientific programming using both interpreted and compiled languages. The course will involve interactive lecture/laboratory sessions in which new concepts will be immediately applied. Students will gain experience doing scientific computing on systems ranging from laptops, to Linux clusters, to massively parallel supercomputers. All software used in the course is open-source so the tools taught will be freely available for students to use in their research.

STUDENT LEARNING OUTCOMES:

Course learning outcomes of this course are aligned with the following programmatic learning outcomes of the Chemistry and Chemical Biology major:

PLO 1: Fundamental knowledge and skills.

PLO 2: Scientific methodology

These learning outcomes are both embodied in the following six specific course outcomes. By the end of this course, students will be able to:

1. Use the Linux operating system for data management, analysis and programming.
2. Use scientific programming tools including scriptable editors, debuggers and revision control systems.
3. Write scripts in the R statistical programming language to analyze and plot data.
4. Write scientific programs using the interpreted programming language Python
5. Write scientific programs using the compiled programming languages
6. Effectively use queue-based remote supercomputers for running scientific simulations.

These learning outcomes map onto the class sections as follows:

Unit	Theme	Weeks	1	2	3	4	5	6
I	Computing system tools	1-2	X	X				
II	Data analysis using R	3-4			X			
III	Scientific programming in Python	5-7		X		X		
IV	Scientific programming in compiled languages	8-12	X	X			X	
V	Large scale scientific computing	13-15	X					X

GENERAL COURSE LOGISTICS

REQUIRED TEXT: There are no required textbooks for this course, but online reference materials will be posted to the course website.

COURSE WEBSITE: The CHEM 160 website is part of the UCMCROPS course management system and will be automatically available to all students enrolled in the class. This UCMCROPS site contains the course announcements; electronic copies course materials, links to online materials, supplementary readings, and various course-related announcements.

COMPUTER ACCESS: This course will require all students to have access to a computer from which they can log on to Linux servers on campus and/or on which they can install a version of Linux. Students will also get computer accounts on scientific computing systems at UC Merced and remote facilities. Students must agree to use these systems responsibly and in accordance with all relevant laws and policies.

CLASS SESSIONS: Two 100 minute combined lecture/laboratory sessions per week in a Linux Lab

OFFICE HOURS: Two hours per week.

COMPUTER PROJECTS: CHEM 160 will require 2 programming projects.

HOMEWORKS AND QUIZZES: There will be approximately 20 homework assignments and 24 short online quizzes.

COURSE POINTS: Grades will be based upon points received for the projects and quizzes, based on the following scale (which may be adjusted as the course progresses).

Activity	Number	Percentage of Final Grade
Projects	2	30%
Homeworks	14	50%
Quizzes	24	20%
Total		100%

LETTER GRADES:

The final distribution of grades in CHEM 160 will depend on the overall achievement of the students in the course, but the following grades will be *guaranteed* to students achieving the indicated percentage of the total possible points in the course

Grade	% of total points achieved
A (A-, A, or A+)	Over 90%
B (B-, B, or B+)	Over 80%
C (C-, C, or C+)	Over 70%
D (D-, D, or D+)	Over 60%

Information on grade appeals, incompletes, etc. can be found at the end of this document and in the *UC Merced Grading Policy* available from the Registrar (<http://registrar.ucmerced.edu/policies/grades>).

STUDENT SERVICES:

UC Merced is committed to make our courses accessible to all students, including students with limited mobility, impaired hearing or vision, and learning disabilities. Students with special needs should contact their advisor as early as possible in the semester so that appropriate arrangements can be made.

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable

accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Center: <http://disability.ucmerced.edu/>.

LATE ASSIGNMENTS:

Computational projects turned in after their due date will automatically have a fraction of the total point possible point value deducted. There will be a penalty of 25% deducted for every week after the due date and no assignments will be accepted more than 2 weeks late. The only exceptions will in the case of documented acceptable excuses.

ACADEMIC INTEGRITY:

You are not allowed to work with another person on the projects for this class. At the first instance of copied projects, a grade penalty greater than the point value of the assignment will be given to students with duplicate answers. Subsequent copied assignments may be forwarded to the Vice-Chancellor for Undergraduate Affairs and the Office for Judicial Affairs and could lead to dismissal from course or university (see section on Academic Integrity below).

Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the *UC Merced Interim Academic Honesty Policy and Adjudication Procedures* available from your instructor. The following general guidelines are adapted from UC Davis Code of Academic Conduct (<http://sja.ucdavis.edu/>):

Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations
- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct which you witness.
- Do not submit the same work in more than one class. Unless otherwise specified by the instructor, all work submitted to fulfill course requirements must be work done by the student specifically for that course. This means that work submitted for one course cannot be used to satisfy requirements of another course unless the student obtains permission from the instructor.
- Unless permitted by the instructor, do not work with others on graded coursework, including in class and take-home tests, papers, or homework assignments. When an instructor specifically informs students that they may collaborate on work required for a course, the extent of the collaboration must not exceed the limits set by the instructor.
- Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source. Students who are confused about whether a particular act constitutes plagiarism should consult the instructor who gave the assignment.
- Know the rules. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

ESS 174: Stable Isotope Ecology

Course Title	Stable Isotope Ecology
Abbreviated Course Title	Stable Isotope Ecology
Course Subject	ESS
Course Number	174
School Submitting Request	Natural Sciences
Division	Upper Division
Effective Term	Fall 2015
Discontinuance Term	----
Lower Unit Limit	4
Upper Unit Limit	4
Prerequisites	ESS 148 or consent of instructor for undergraduates.
Prerequisites with a Concurrent Option	
Corequisites	
Major Restrictions	
Class Level Restrictions	Junior and senior class. The fundamentals of stable isotope ecology, biochemistry, and geochemistry using both lecture and lab. Isotope systematics for carbon, nitrogen, hydrogen, oxygen, and sulfur and how they operate in plants, animals, soils, microbes, and enzymes are the course's framework. Lab section will teach sample preparation and hypothesis building using stable isotopes.
Course Description	
TIE Code	T: Lecture plus Supplementary Activity
Reasons for Request	New Course
Brief Explanation of Change(s)	New Course Number This is a new course. Lecture: 3 contact, 0 non-contact Lab: 2 contact, 1 non-contact Seminar: 0 contact, 0 non-contact Discussion: 0 contact, 3 non-contact Tutorial: 0 contact, 2 non-contact Field: 1 contact, 0 non-contact Studio: 0 contact, 0 non-contact
Total Contact/Non-contact Hours Per Week	
Total Hours Per Week	12
Grading Options	Letter Grade Only
In Progress Grading	
Maximum Enrollment	20
Maximum Enrollment Reason	----
Cross-listing	BIO 174.
Conjoined	ES 274.
Cross-listed Schools	Natural Sciences

Can this course be repeated?

No

How many times?

Resource Requirements

Classroom, Fogel's lab, needs common analytical supplies for stable isotope analysis, local transportation only.

Does this satisfy a General Education Requirement?

No

Course Outline and/or Additional Documentation

 [ESS174BIO174ES274 Syllabus.docx \(39Kb\)](#)

UNIVERSITY OF CALIFORNIA, MERCED
BIO 174/ESS 174/ES 274: Stable Isotope Ecology – Syllabus

Lecture time: Mondays, Wednesdays, 1 hour and 15 minutes
Lecture location: Traditional Classroom
Lab Location: Professor Fogel's Stable isotope lab
Exam Date/Location: Research papers to be turned in by end of the semester
Credits: 4 CREDITS

Instructor: Professor Marilyn L. Fogel (mfogel@ucmerced.edu)
Science and Engineering Bldg., Rm. 294; Office Phone: 209-205-6743
Office hours: Mondays and by appointment

- I. Course Description:** This class will teach the fundamentals of stable isotope ecology, biochemistry, and geochemistry using both lecture and lab. Isotope systematics for carbon, nitrogen, hydrogen, oxygen, and sulfur and how they operate in plants, animals, soils, microbes, and enzymes will form the framework for the class. Corresponding lab section will teach sample preparation and hypothesis building using stable isotopes.

This course fulfills an upper division requirement for the Earth Systems Science Major and a requirement for the ES graduate student. You will learn about stable isotope ecology, biogeochemistry, chemistry, biochemistry, and physics. *Prerequisite: ESS 148 or consent of instructor for undergraduates. Normal Letter Grade only.*

II. Course Goals and Outcomes:

a. Course Goals:

- Learn key concepts and major topics in stable isotope ecology, including: the isotope systematics for carbon, nitrogen, oxygen, hydrogen, and sulfur; food web and trophic analysis; basic understanding of chemistry, physics, and biochemistry of isotope partitioning
- Learn to manipulate isotopic data including graphs and modeling
- Read, understand, and write about stable isotope literature
- Evaluate an ecosystem using stable isotope measurements
- Understand and experiment with the methods used in isotope ecological research
- Be able to communicate ecological knowledge to other scientists

b. Learning Outcomes: At the end of the course, students should be able to:

- Explain fundamental isotopic principles that pertain to individual organisms, to populations, to communities, to ecosystems, and to the globe.
- Describe and understand the various techniques used in stable isotope chemistry and ecology, from computation to experimental, and how these techniques are coupled with the scientific method to address ecological questions
- Critically evaluate the scientific literature, and take ownership of the course material to improve functioning in society

III. Format and Procedures:

1. This course is structured as follows: two 1 hour and 15-minute lecture sessions per week.
2. Students will be required to attend **8 3-hour laboratory sessions in Professor Fogel's Lab**.
3. Lab visits will be alternated with 8 3-hour field trips to the UC Merced's Vernal Pools and Grassland Reserve, which is adjacent to campus.
4. Graduate students will have an additional 50 discussion section.

IV. Course Requirements & Grading Procedures:**a. Class Attendance and Participation Policy:**

Students are expected to attend all lectures. This is a small class, and your participation is valuable to everyone's learning experience. Please notify me by email if you plan to miss a lecture.

b. Required and Supplemental Readings:

Required Textbook: *Stable Isotopes in Ecology and Environmental Science*, eds., Robert Michener and Kate Lajtha, Blackwell Publishing, 2nd Edition.

Supplemental Reading: Several isotope geochemistry and ecology books are available from Marilyn Fogel, in Room 294, SE1, and can be checked out for 1 week.

Reading Primary Literature: We will be covering about 5 papers per week for the lectures. You will be responsible for knowing the content, asking questions during class, and summarizing for your final research papers. Students will be asked to bring to lab section one paper per week that is of particular interest to them.

c. Course Assignments and Projects:

Assignments (e.g., homework, field reports) should be handed in on time. Late assignments will only be accepted that calendar week and will automatically receive one letter grade lower.

Homework: The assignments will include working on graphing, reading, and writing and will be directly related to material presented in class.

Local Field Trips: These trips are designed to introduce students to teach basic concepts needed for understanding field sampling for stable isotope ecology. We will be doing our sampling at UC Merced's Vernal Pool and Grasslands reserve, which is adjacent to campus.

Quizzes: Quizzes will given every other week. Students will be responsible for creating, grading, and discussing one quiz. Subject matter will relate to the topics that we discussed the previous week.

Exams: In lieu of exams, students are required to write two research papers.

1. The first paper ("*Elements*" Paper) will be written by each student and submitted in stages prior to final submission prior to the last day of class. Students will chose one element and write a 10-15 page paper on how that isotopic system works, in particular, how stable isotopes might be used to solve a problem in her/his field of interest.

- a. Ideas for papers are due at the end of Week 5.

- b. Outlines or notes on the content of the papers are due during Week 9.
- c. The first draft is due on Week 12.
- d. The 2nd draft is due on Week 14.
- e. Final submission is due on the end of class by 12 midnight.

2. The second paper is a group effort and designed to teach you how to manipulate real isotope data. We will be collecting data on the Vernal Pools and Grasslands ecosystem. Early in the class we will form research subgroups, go through all of the steps in writing a paper. *A complete draft of the paper is due by the end of class.*

- d. **Grading:** Your final grade will be based on a total of 1100 points: class participation (100 points: attendance, discussion frequency), quizzes (160 points) lab and field participation (200 points), individual "Element" paper (340 points); group research paper (300 points). This course is designed for motivated students, and it is expected that each student will complete all assignments and be responsible for engaging in the activities.

V. **Academic Integrity:** Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty.

- a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy (<http://studentlife.ucmerced.edu/what-we-do/student-judicial-affairs/academicy-honesty-policy>). Any work submitted by a student in this course for academic credit will be the student's own work or clearly identified group work.
- b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied *will both automatically receive a zero for the assignment.*
- c. Take responsibility for honorable behavior. Make every effort to prevent and avoid academic misconduct, and report acts of misconduct.
 - Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source.
 - Know the rules --- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. Requests for academic accommodations are to be made during the first 3 weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services

Center to verify their eligibility for appropriate accommodations. The instructor will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please speak with the instructor during the 1st week of class regarding any potential academic conflict.

	Weekly Topic & Learning Goals	Key Learning Outcomes	Readings	Assessments
1	Introduction to the Class and Logistics	Start to use key terms for describing stable isotope systematics	Chapter 1	
2	Carbon isotope fractionation in plants	Carbon isotopes in plants and the atmosphere	Chapter 2; Various papers	
	Carbon isotope fractionation in plants, cont.	C3, C4, and CAM Plants, Ecophysiology and carbon isotopes	Tu and Dawson; Pataki et al.	Quiz #1: Volunteer needed.
3	Nitrogen and carbon isotope in food webs	Combining stable isotope systems	Chapter 3; Chapter 4; Chapter 5; Various papers	
	Nitrogen and carbon isotopes in food webs, cont.	Constructing basic food webs	Chapter 9	Quiz #2: Volunteer needed
	First Field trip to VP/GL Reserve; Date to be determined	Understand the scope of a field collection for isotope analysis		
4	Principles of chemistry and physics	Understanding of physical and chemical processes; Equilibrium and kinetic fractionation	Sharp Chapters 1 and 2	
	Principles of chemistry and physics, cont.	Cont.		Quiz #3: Volunteer needed.
5	Hydrogen isotopes systematics	Understand how stable hydrogen isotopes are used to understand the hydrological cycle	Clark and Fritiz; Faure O and H; Hoefs Hydrosphere;	
	Hydrogen isotopes in food web studies	Understand how stable isotopes are used in food web studies	Chapter 6; various papers	
	2 nd Field Trip to VP/GL Reserve; Date to be determined	Begin field collection and sampling design.		
	Ideas for individual paper due (CROPS)			Research paper ideas due on CROPS
6	Graphing and data analysis	Using data files from other studies, learn how to make graphs that showcase results; understand variation	Various papers	
	Graphing and data analysis, cont.	Use R to create food web models.	Chapter 13	Quiz #4, volunteer needed.
7	Measurements and Gear	Understand how an isotope ratio mass spectrometer works	Encyclopedia of Mass Spec Chapters	
	Measurements and Gear, cont.	Understand how an elemental analyzer, GC-Combustion system works		Quiz #5; Volunteer needed
	Laboratory Sample prep			
8	Oxygen isotopes in hydrology, carbonates	Understand oxygen isotope systematics in water and inorganic materials	Sharp Chapters 4 and 6	
	Oxygen isotopes in plants, animals		Chapter 11	
	3 rd Field to Reserve: Date to be determined.	Continue to develop sample collection and ancillary measurements		
9	Analytical Issues	Precision vs. Accuracy; Isotope standards; How to determine biological vs. analytical variation	Sharp Chapters 1 and 2; various papers	
	Sample Preparation #2	Learn how to preserve and collect samples		Quiz #6; Volunteer Needed.

	Weekly Topic & Learning Goals	Key Learning Outcomes	Readings	Assessments
	Individual "Element" paper outline			Outline and notes for paper (CROPS)
10	Review and sample preparation			
11	Physiology and Biochemistry	Learn the molecular basis for isotope fractionation	Various papers	
	Physiology and Biochemistry, cont.			Quiz #7: volunteer needed
	Preparation of VP/GL reserve samples			
12	Compound Specific Isotope Analysis	Learn about lipid analyses	Chapter 14	
	Compound Specific Isotope Analysis, cont.	Learn about amino acid analyses	Popp et al Tuna	Quiz #8: volunteer needed
	4 th field trip to VP/GL Reserve: Date to be determined			
	1 st Draft of Element paper due (CROPS)			1 st draft of Element paper (CROPS)
13	1Sulfur isotope systematics	Understand sulfur isotope systematics	Chapter 8; various papers	
	Trophic discrimination			Quiz #9; volunteer needed.
	Isotope analytical sessions			
14	1 st Discussion on analyzing VP/GL data	Learn first hand data analysis		
	Forming a research paper	Discuss introduction, methods, etc.; Develop the outline and determine writing assignments: Introduction, Methods, Field Area, Results, Discussion, Literature review		Outline for VP/GL Collaborative Paper (CROPS); Writing assignments
	Independent field trip or analytical session(s) as needed: Date to be determined			
	Revised Elements paper due (CROPS)			Revised Elements Paper
15	Isotopes and Astrobiology	5 Minute Talks on how you would incorporate stable isotopes into your own research	Various papers	3-Powerpoint slides per person
	Strontium Isotopes	5 Minute Talks on how you would incorporate stable isotopes into your own research		1 st Draft of VP/GL writing assignments due
	Independent field trip or analytical session(s) as needed: Date to be determined			
16	2 nd Presentation of VP/GL research	How to present original research		Prepare Powerpoint presentation to the class

	Non-traditional stable isotopes	Calcium, Iron, Magnesium, Mercury isotopes in biological systems		Quiz #10
	Independent field trip or analytical session(s) as needed: Date to be determined			
17	Final Elements paper due (CROPS)	Literature review and synthesis		Individual Paper
	Complete Revised Draft VP/GL Research Paper	Original research paper		Group Paper

Admission Options of Transfer Applicants for the School of Social Sciences, Humanities and Arts

Revised Copy – Effective Fall 2015

Rationale:

Attracting and retaining qualified transfer students depends on the preparation of the transfer student admitted into our majors. At the moment, many transfer applicants are not well qualified to enroll in and successfully complete some of our required major courses in a timely manner. Though factors impacting transfer student preparedness vary, from lack of consistent course offerings to competing personal obligations, it can greatly impact their progress in their selected majors. We must be mindful of our responsibility to maintain equal levels of access for transfers, relative to the access afforded to our native population while at the same time ensuring that we are attracting and retaining qualified students.

Proposal:

After consultation with the Office of Admissions, the SSHA Office of Advising proposed this plan to address the full range of issues related to transfer preparation in the admissions process, as early as Fall 2012.

With the idea that we must ensure the best possible access to the priority courses for transfers who might be successful in our programs at UCM, the following three part approach is proposed:

- Admission to Major
- Admission with Conditional Approval
- Denied: Admission to Alternative Major Possible

Exceptions to the above admission policy can be made at the discretion of the School of Social Sciences, Humanities and Arts; including reconsideration into the selected major if certain criteria is achieved within a year of admission.

Admission Options:

I. Admission to the Major (Approved Status)

Applicants will, at the time of admission have completed TAG (Transfer Agreement Guarantee) or have completed at minimum courses listed in each of the following categories of major preparation with a C- or higher:

University and Campus Requirements (Completion of all three)
<i>University of California Entry Level Writing Requirement</i>
<i>WRI 10: College Reading and Composition or equivalent</i>
<i>Mathematics/Quantitative Reasoning</i>

Admission Options of Transfer Applicants for the School of Social Sciences, Humanities and Arts

Revised Copy – Effective Fall 2015

Introductory Course or Sequence	
<i>Anthropology</i>	At least one from: ANTH 1, ANTH 3, ANTH 5
<i>Cognitive Science (BA)</i>	At least one from: COGS 1 or PSY 1
<i>Cognitive Science (BS)</i>	At least one from: COGS 1 or PSY 1
<i>Economics</i>	ECON 1
<i>English</i>	At least two from: ENG 10-89, one of which should be from ENG 50-89
<i>History (U.S. or World)</i>	At least two from: HIST 10-11, HIST 16-17 or HIST 30-31
<i>Management <u>and Business Economics</u></i>	ECON 1
<i>Political Science</i>	At least one from: POLI 1, POLI 3, POLI 5
<i>Psychology</i>	PSY 1
<i>Spanish</i>	SPAN 004 or SPAN 011
<i>Sociology</i>	SOC 1

Required Math (or math pre-requisite)	
<i>Anthropology</i>	None required
<i>Cognitive Science (BA)</i>	PSY 10 and MATH 5 or 11
<i>Cognitive Science (BS)</i>	PSY 10 and MATH 11 or 12
<i>Economics</i>	MATH 11
<i>English</i>	None required
<i>History (U.S.)</i>	None required
<i>History (World)</i>	None required
<i>Management <u>and Business Economics</u></i>	MATH 11
<i>Political Science</i>	POLI 10 <u>None required</u>
<i>Psychology</i>	PSY 10

Admission Options of Transfer Applicants for the School of Social Sciences, Humanities and Arts

Revised Copy – Effective Fall 2015

<i>Spanish</i>	None required
<i>Sociology</i>	SOC 10 or MATH 5

Any outstanding general education or major preparation coursework will be completed at UC Merced.

II. Admission with Conditional Approval (Undeclared SSHA)

Transfer students who demonstrate significant promise for success will be admitted to the major with the condition that they complete, **within one year from the semester of admission**, the specific major prep coursework required by their selected major within the School of Social Sciences, Humanities and Arts. Students admitted with this status will be expected to successfully complete all remaining lower division major preparation courses, including all quantitative courses, plus any additional set of courses determined by the faculty, to declare their desired major. Students’ schedules should be approved by their academic advisor each term to ensure they are meeting the conditions to progress toward their desired degree in a timely manner. The School of Social Sciences, Humanities and Arts will determine if students have fulfilled the established conditions. Students who are conditionally approved should be prepared to declare an alternative major if after one year they have not met the criteria of their conditional admission.

Please note: Students may be admitted undeclared SSHA only if their primary application major is housed in the School of Social Sciences, Humanities and Arts. Students whose primary application majors are in the School of Natural Sciences or Engineering may not be admitted with conditional approval in SSHA.

Applicants admitted with Conditional Approval will, at the time of admission, have completed each of the following courses with a “C-” or better:

University and Campus Requirements (Completion of all three)	
<i>University of California Entry Level Writing Requirement</i>	
<i>WRI 10: College Reading and Composition or equivalent</i>	
<i>Mathematics/Quantitative Reasoning</i>	

Introductory Course or Sequence	
<i>Anthropology</i>	At least one from: ANTH 1, ANTH 3, ANTH 5
<i>Cognitive Science (BA)</i>	At least one from: COGS 1 or PSY 1

Admission Options of Transfer Applicants for the School of Social Sciences, Humanities and Arts

Revised Copy – Effective Fall 2015

<i>Cognitive Science (BS)</i>	At least one from: COGS 1 or PSY 1
<i>Economics</i>	ECON 1
<i>English</i>	At least two from: ENG 10-89, one of which should be from ENG 50-89
<i>History (U.S. or World)</i>	At least two from: HIST 10-11, HIST 16-17 or HIST 30-31
<i>Management <u>and Business Economics</u></i>	ECON 1
<i>Political Science</i>	At least one from: POLI 1, POLI 3, POLI 5
<i>Psychology</i>	PSY 1
<i>Spanish</i>	SPAN 004 or SPAN 011
<i>Sociology</i>	SOC 1

Any outstanding general education or major preparation coursework will be completed at UC Merced.

Denied: Admission to Alternative SSHA Major Possible

Applicants who meet eligibility for admission but are denied admission to a specific major in the School of Social Sciences, Humanities and Arts may be admitted into a secondary major (if they meet their secondary major's admission requirements as outlined in II. Admission with Conditional Approval), at the discretion of the School.

Denied: The Schools of Engineering or Natural Sciences

To be implemented for Fall 2015.

Transfer students who are denied admission to the Schools of Engineering or Natural Sciences at the time of matriculation may be admitted to the School of Social Sciences, Humanities and Arts in their first term, provided that they meet eligibility for admission and meet the secondary major's admission requirements as outlined in II.

Transfer students who are admitted or conditionally admitted to the Schools of Engineering or Natural Sciences and wish to declare a major after the major change deadline for their first term, may only do so if they are eligible to change their major (as defined by the Change of Major Policy) and meet the secondary major's admissions requirements as outlined in II at the time of application.

Contingent on the approval from the School of Social Sciences, Humanities and Arts Curriculum Committee and the Undergraduate Council's Subcommittee on Admissions, this process may be implemented as early as Fall 2015.



Office of the Registrar
University of California, Merced
5200 N. Lake Road
Merced, CA 95343
(209) 228-7178

MEMORANDUM

TO: Undergraduate Council
FROM: Erin Webb, Associate Registrar
RE: Curriculum Revisions and Catalog Review
DATE: October 14, 2014

Beginning with the first University of California, Merced Catalog in 2004-2005, the entire catalog content from each of the Schools has been submitted to Undergraduate Council (UGC) for review, comment and approval. In an effort to more efficiently use faculty resources, the Office of the Registrar proposes revising the current process as outlined in the attached document.

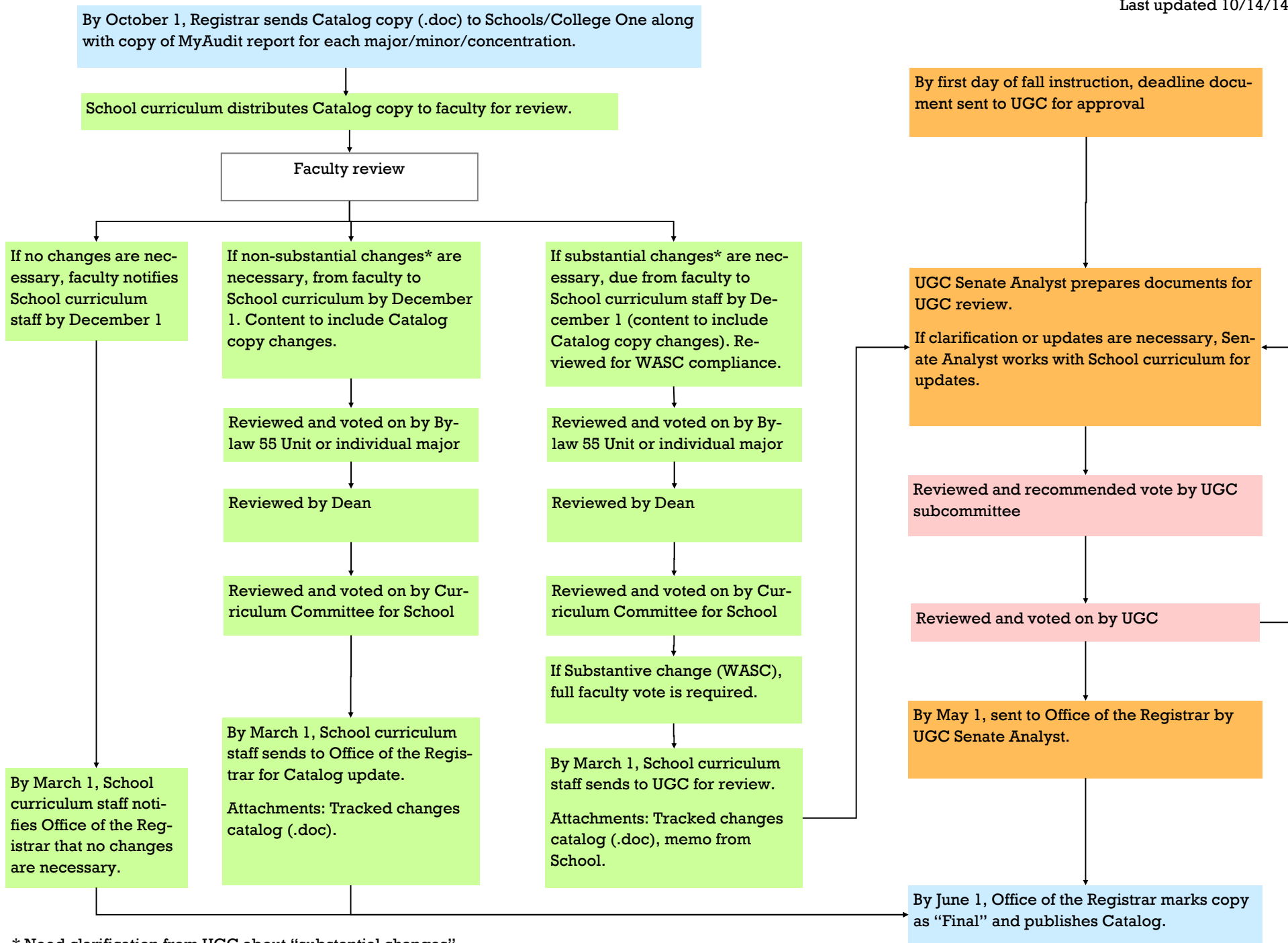
Central to the proposed process is the definition of “substantial change.” Substantial change is proposed to be the criteria by which revisions moving forward from the Schools’ curriculum committees would either be routed to UGC for review or move directly to the Catalog production staff for adoption.

In arriving at a definition of substantial change, the following items should be considered: typographical errors; formatting revisions; grammar, punctuation and sentence structure; changes to course titles or units (if the CRF has already been approved); revisions to program learning outcomes; revisions to length of program; course change from required to optional or vice versa; creation or dissolution of honors programs; and the Dean’s letter.

The above list is not meant to be comprehensive but to provide some framework for the type of changes reviewed by UGC in the past. Faculty will likely develop a more robust set of potential revisions as they consider the proposal.

We look forward to your comment and are eager to answer any questions you might have regarding the attached proposal.

Cc: Mark Aldenderfer, Dean, School of Social Sciences, Humanities and Arts
Juan Meza, Dean, School of Natural Sciences
Erik Rolland, Interim Dean, School of Engineering
Laura Martin, Coordinator of Institutional Assessment
Laurie Herbrand, University Registrar



* Need clarification from UGC about "substantial changes"



SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS

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February 24, 2015

To: Undergraduate Council

Re: Major in Global Arts Studies Proposal

On February 5, 2015, the School of Social Sciences, Humanities and Arts Curriculum Committee unanimously voted to approve the *Major in Global Arts Studies (GASP)* proposal.

On February 19, 2015, the voting period to consider the *Major in Global Arts Studies (GASP)* concluded with the proposal being approved by the SSHA faculty. Therefore, on behalf of the School of Social Sciences, Humanities and Arts, I submit to you the *Major in Global Arts Studies (GASP)* proposal (68 votes for; 3 vote against; 2 abstention; 28 ballots not returned).

A copy of the *Major in Global Arts Studies (GASP)* proposal is enclosed for your review. We request that the proposal be approved effective Fall 2016. The SSHA assessment specialist supported the faculty efforts in the creation of the PLOs, curriculum map and corresponding multi-year assessment plan, ensuring compliance with campus [guidelines](#).

Thank you for your consideration.

A handwritten signature in black ink, appearing to read "Mark Aldenderfer".

Mark Aldenderfer
Dean, SSHA

CC: Jan Goggans, Chair, SSHA Curriculum Committee
James Ortez, Assistant Dean, SSHA
Megan Topete, Manager of Instructional Services, SSHA
Morghana Young Alfaro, Manager of Student & Program Assessment

Enclosure

GASP Major Proposal

1. Program description and rationale

The major in Global Arts Studies at UC Merced will educate students in the history, theory, and practice of the arts in a global context. The program will bring together disciplines traditionally housed in different departments, including art history, visual studies, musicology and ethnomusicology, music performance, and studio art. The curriculum for the Global Arts Studies major will integrate creative practice and hands-on training with the theoretical analysis of visual, sonic, and material culture. We aim to foster a new generation of critical thinkers with global and interdisciplinary perspectives, grounded in deep historical and theoretical knowledge.

The program will be global in many senses of the word. Our studies will not privilege one geographic space over another. We will be rigorous in the study of all kinds of human expression, from film screen to dance club, from ritual and touristic practice to museum and concert hall. Our faculty of ethnomusicologists and art historians will help students refine the skills they need to engage critically with culturally diverse media. We will train our students to deal with both sonic and visual realms, granting them sophisticated insights into multi-media performances and artworks—architecture, film and television, operas, video games and other interactive media, music videos, and dances both staged and social. Our students will deepen their understanding of these expressions with studies of their history and social relevance, with an array of theoretical and methodological perspectives and approaches to them, and not least with hands-on practical training in painting, sculpture, design, photography, music, and dance. The program will also offer students ample opportunity to develop their professional skills via participation in community-based events—curating exhibitions, managing the UCM Art Gallery, and organizing and performing in recitals, concerts, and multi-media presentations.

The breadth of our program is obvious, but we also have much to offer in terms of depth. As GASP faculty we all have our own individual in-depth disciplinary training but all of us deal with multiple academic fields. Some of our courses are interdisciplinary in character and others will have a strong disciplinary focus. Second, we are dedicated to developing a rigorous methodological training of four basic skills that will be relevant within the major, outside the major, and as preparation for both graduate school and the general job market: research, analysis, argumentation, and writing.

We believe this major will have several advantages over more traditional art and music majors. Our dedication to addressing “high,” “low,” and “middle-brow” culture on equal terms will allow us to disempower and critique classist hierarchies of taste and value. Our commitment to training our students to do in-depth analysis in multiple media will help them fill in the problematic lacunae that plague much current scholarship on multimedia art forms—film scholars’ traditional lack of attention to musical scoring, music scholars’ traditional lack of serious attention to libretto and stagecraft in opera, and so forth. And our geographical flexibility will allow us to avoid the major pitfalls that stem from dividing up the world along colonialist lines of geography and race—“the West and the rest.”

The GASP major builds on the Arts minor and will continue to employ the same resources and existing courses in studio art, music ensemble, GASP lectures and seminars. Most of the studio art and ensemble courses will be slightly adjusted to comport with the new guidelines but they will largely remain in place because the majors will be required to take at least eight units of studio art and/or music ensemble. The minors will be given the opportunity to pursue a

BA in GASP if they so choose using the units taken before the major was established.

1.1 How the program will contribute to undergraduate education at UC Merced

As mentioned in the Program Rationale, the Global Arts Studies Program will bring together disciplines, which although traditionally housed in different departments, are also inherently interdisciplinary. The coming together of art history, visual studies, musicology, ethnomusicology, music performance, and studio art will support the interdisciplinary goals of UC Merced both within and outside of GASP. Art history and musicology engage not only with the visual and the musical, but also with other cultural contexts that inform them such as history, literature, human encounters, spatial analyses, issues of trade, memory, and identity—contexts that are central to several humanities disciplines. Within GASP, students will learn to not only analyze visuals or sonic materials but also to examine them in conjunction with each other—a task typically not undertaken by traditional art history or musicology programs. For example, GASP majors will be required to take a course entitled “Image and Sound,” in which they will engage in multimedia analysis of a wide range of potential subjects, from film, television, and music video to music in ritual architectural spaces. Students in existing Majors such as Anthropology, English, Cognitive Science, History, Philosophy, Political Science, Sociology, and Spanish, and those with interests in World Heritage and performance studies will benefit from an engagement with GASP courses, which will allow students to use visual and sonic materials to enrich approaches to their respective disciplines.

GASP Majors, ARTS Minors, and other students will be able to take advantage of museums and performing arts centers in Merced and the Bay Area for course assignments. These will also be useful for faculty in developing their pedagogy. For example, the GASP Major gives us the potential to maintain and foster relationships between UC Merced and the Merced Arts Council and Playhouse Merced. With logistical support, such interactions can also be developed with the Asian Art Museum, the Museum of Modern Art in San Francisco, and centers of musical arts in the Bay Area, as well as with galleries and music halls throughout the Central Valley. Fostering relationships with community organizations and exposing students to Bay Area institutions will permit students to relate classroom knowledge to practical experiences. This will also connect students to potential job opportunities by creating networks in these community organizations.

The GASP Major will have a strong writing component. The writing skills students acquire, along with skills of close reading of visual and sonic texts, will prove useful in a wide range of Humanities, Social Science, and even Science disciplines.

Another significant contribution of the GASP Major to undergraduate education is the possibility of our majors to participate in the University of California Education Abroad Program (UCEAP).

They will feel more motivated to take up these programs as it will provide them an opportunity to visit historic sites, museums, and centers of performing arts outside the U.S.—spaces that they would have, thus far, only examined in class. The potential for GASP to move students towards UCEAP programs will not only broaden their worldview but will also foster an engagement with Humanities and Arts majors in the wider UC system. GASP’s focus on global networks that highlights cultural encounters and pays attention to both Western and non-Western materials will make students critically aware of the politics of our times as they are manifested in cultural objects.

1.2 Job market demand, graduate education/professional school prospect for majors and expected student demand

1.2.1 Job market demand and graduate education/professional schools

Broadly speaking, we are working on developing essential skills such as how to think critically, how to write, how to convince an audience, how to do research and distinguish reliable from unreliable sources. These are useful for a variety of jobs that require analytical and writing skills. We are also training students to appreciate and use sources that are different from the textual sources that historians typically use. Students will learn how we can develop historical and contextual analysis through visual and sonic sources. If they choose to pursue graduate studies, GASP majors will know the value of tangible and intangible materials of cultural production, which will help them in a variety of humanities and arts disciplines.

The GASP capstone sequence will help develop skills of research, writing, and analysis. It will also push students to engage with critical theory and use it to support their own research and arguments. The GASP program will also be excellent preparation for graduate school. We will shape visual arts students who can analyze sonic materials, and music majors who will be able to examine visual objects and spaces. GASP majors will make for attractive graduate school candidates in both Art History and Musicology because they will have training that goes beyond traditional programs in these disciplines.

Art History and Musicology and their comparative study are useful for a wide range of professions both in academic and cultural spheres. For example:

- a) Arts Administration & Management: Art curation in Museums and Galleries, Music Management, and Auction houses, Museum Education, Program Manager for Arts and Music-related Trusts, Foundations, and Grant-giving agencies.
- b) Art Criticism & Journalism: Art, Film, or Music critic or contributor in leading national newspapers or online web-zines.
- c) Art Law: International Art Law (after specialized graduate degree or relevant work experience).
- d) Media and Entertainment Industry: Advertising, Public Relations, Film and Media Studies, potentially go to Film School for specialized training.
- e) Heritage & Cultural Property Management: Travel and Tourism industry, UNESCO projects.
- f) Art, Music and Film Conservation: After specialized graduate degree or relevant work experience.
- g) Art or Music Repository: Art or Music Librarian or Archivist at an institution of higher learning or at a public or private archive. Head of a Visual Resources Center, which is often part of traditional Art History or Film Studies Departments, is also a possibility.
- h) Graduate Education: Visual studies, Film Studies, Art History, Ethnomusicology, Critical Musicology, History, Anthropology.

1.2.2 Expected student demand

We expect to attract a substantial number of students once a GASP Major is established based on several factors. Our enrollment data indicates students' sustained interest in arts courses. Based on SSHA's census data, there has been a demonstrative increase in the number of students who chose to pursue an ARTS Minor, which was established in 2008 and required students to take courses in both GASP and ARTS.

As there were more ARTS lecturers to offer a greater number of classes without prerequisites in the early years of the program, the enrollment numbers in ARTS have been historically bigger than those in GASP. In 2008, GASP was established as a prefix to designate research and scholarly courses in the arts, as opposed to technique- and practice-oriented classes in ARTS. Since taking over the role of the program lead for both GASP and ARTS in 2011, Prof. Wang initiated the process of integrating both programs into a coherent curriculum, which including cross-listing courses, decreasing our reliance on lecturer-taught classes, and increasing the variety of course offerings that would benefit more students.

Students in ARTS Minor

YEAR	NUMBER
2008-2009	15
2009-2010	40
2010-2011	72
2011-2012	69
2012-2013	58

GASP-ARTS Enrollment Data	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total Enrollment	Total Students taught	
ShiPu Wang	37	66	112	98	99	118	22	53		605	(F '10 on leave)
Kevin Fellezs	40	88	77	119	61	/	/	/		385	(left UCM in 2011)
David Kaminsky	/	/	/	/	/	/	52	72		124	(Joined in 2012)
Ken Yoshida	/	/	/	/	/	/	64	93		157	(Joined in 2012)
Aditi Chandra	/	/	/	/	/	/	/	88		88	(Joined in 2013)
Enrollment of faculty-taught GASP courses	77	154	189	217	160	118	138	306			
Number of Lecturers*	0	0	2	1	1	2	2	2			*See Note 1
Enrollment of lecturer-taught GASP courses	n/a	n/a	59	23	13	318	348	117			
Total GASP enrollment	n/a	n/a	248	240	173	436	486	423	2006	1359	
Dunya Ramicova			119	141	94	133	0	144			(AY 2012-13 on leave)
Enrollment of lecturer-taught ARTS courses			450	562	589	743	684	664			(excluding cross-listed GASP courses)
Number of Lecturers**			6	6	7	5	5	6			**See Note 2
Total ARTS enrollment			569	703	683	876	684	808	4323		
GASP + ARTS Total Enrollment****			817	943	856	1312	1170	1231	6329		***See Note 3

Notes

1. GASP has historically been allocated few lecturers. When hired, lecturers were asked to teach cross-listed courses that benefit both GASP and ARTS; the same has not applied to lecturers in ARTS due to their technique-oriented instruction.
2. For historical data consistency, this includes Ms. Lorraine Walsh, who was a SSHA lecturer in 2008-2012 and became a College One lecturer in 2012. She continues to teach ARTS courses that were created by the arts faculty, Prof. Ramicova, not by College One, however.
3. In 2011 and in anticipation of an eventual GASP Major, Prof. Wang began the process of integrating ARTS and GASP, as well as offering more GASP courses. The enrollment data reflects the gradual shift of focus.

1.3 Relation to existing undergraduate programs/B.A.s

1.3.1 Relations to programs on UC Merced campus

The rising interest in image and sound analysis in humanistic research and pedagogy also makes the skills students acquire in GASP courses highly desirable in other disciplinary settings. An English major who wishes to study visual representation in literary history will benefit from art history and visual studies courses; a student interested in theater will gain hands-on experience in ensemble and performance classes; a history major studying audio culture will gain a more robust understanding by taking music courses.

In addition to its interdisciplinary approach, the program's curricular structure reflects our commitment to study the cultural and intellectual effects of globalization. Many of our courses deal with postcolonialism, gender, race, and power that other disciplines on campus also address. Students enrolled in a Spanish course that examines transnational literature and film (e.g. SPAN 111: Empire, The Postcolonial, and Representation: Reading East & West) will most certainly find the subject of global visual arts quite useful. GASP's introductory requirements (GASP 3 and 5), electives, and upper-division sequence, all of which cover visual and sonic representation of gender and race, politics of art and historical memory, will complement many courses offered in History and Anthropology.

1.3.2 Relations to programs at other UC campuses

Most UC campuses offer degrees related to visual and sonic arts (i.e. BA in Art History). Therefore, it is important to establish a program dedicated to the practice and study of arts at UC Merced. A number of UC campuses have been very successful in establishing new and exciting programs that have impacted the humanities and much of their rigor emerge from their interdisciplinary model that also characterizes GASP. For instance, the History of Consciousness, a graduate program at UC Santa Cruz composed of literary scholars, historians, anthropologists, ethnomusicologists, artists, and political theorists, has led the humanities for decades. GASP adopts its similar pedagogical and academic structure to provide students with the necessary analytic skills to examine the complexity of creative expressions and cultural practices. However, GASP's curricular constellation that integrates visual, sonic, new media, and performance studies, offers a different theoretical design. Below is a list of arts-related programs at other UC campuses that are comparable to our approach.

UCLA

World Arts and Cultures program (WAC)

This interdisciplinary program explores cross-cultural understanding through arts, with emphasis on performance and dance. Like GASP, WAC's curriculum emphasizes global transaction of expressive practices in an effort to decenter the Western hegemonic tradition of art.

UCI

Visual Studies

The interdisciplinary graduate program in Visual Studies at UC Irvine combines art history and media studies. The program explores the meanings and practices of imaging across historical period and geographic regions.

UCSC

History of Art and Visual Culture Program (HAVC)

UC Santa Cruz's History of Art and Visual Culture program offers both undergraduate and graduate degree in Visual Studies. Similar to UCI's interdisciplinary program, HAVC combines art historical and cultural studies to examine representation and imaging in multiple media and cultural settings.

History of Consciousness

The History of Consciousness Department at UCSC is a graduate program that examines diverse theoretical approaches to gender, race, art, and politics. Its primary methodological framework is critical theory, which allows faculty and students to address issues that cut across multiple disciplines.

1.4. Availability of suitable preparatory at community colleges

Visual Arts: The study of the visual arts form a fairly significant part of the curriculum of the college system of California's Central Valley. Therefore, any transfer students from these institutions to UC Merced who wish to continue their study of visual materials will most likely have their basics in place. However, at almost all community and State colleges around UC Merced, the study of the visual arts (as art history or visual studies) is limited to large surveys of Western art history, which are located in either Studio Art or History programs. This means that while students will indeed learn the basics of art history, they will be restricted in that they will only examine one part of the world and not of the cultural encounters that shape the GASP program. Further, by studying visual or sonic material as secondary to History or Studio Arts, students at local colleges only approach it as secondary to those disciplines. Some larger institutions, such as the California State Universities and Fresno City College, do include wide-ranging surveys of Asian Art. However, their approach to art history follows the traditional, broad survey format. With GASP, we expand this approach by not only focusing on global cultural exchange without losing sight of local specificities as the basis of our lower division visual arts courses, but also by engaging with sonic materials so that our students have a more nuanced understanding of the visual as co-existing with other cultural materials.

Music: Most music programs at Community Colleges will generally have a "traditionalist" approach to music theory. Our approach is different but the first semester of a standard music theory sequence will probably satisfy our "Introduction to Music Studies: Elements of Music" requirement. A range of different courses might satisfy the "Music and Society" requirement at the discretion of the faculty, as long as the student has been given satisfactory ethnographic fieldwork research skills in that or another class (this requirement can also be satisfied with any ethnographic fieldwork methods class at UC Merced).

General: Music or Arts courses in which students have had to write a major research or analytical paper will satisfy the upper-division elective requirement. Ensemble and studio courses taken at other schools can also satisfy studio/ensemble requirements at UC Merced. The following courses must be taken at UC Merced: "Image and Sound," "Theories of Expressive Culture," "Senior Thesis."

The regional colleges surveyed include: Bakersfield College, College of the Sequoias, Cerro Coso Community College, Merced College, Porterville College, Modesto Junior College, San Joaquin Delta College, Reedley Community College, Taft College, West Hills College, California State University at Fresno, California State University at Stanislaus and Fresno City College.

2. Program Requirements

2.1 Lower division and upper division course requirements

Foundational sequence (lower division, no prerequisites) — 8 units

Introduction to Visual Culture [4 units]. This course will give students all the tools they need to enter advanced classes in film studies, art history, and visual analysis. No prerequisites.

Introduction to Music Studies: Elements of Music [4 units]. This course will give students all the tools they need to go into advanced classes in music. Students will learn to hear and discuss music in terms of rhythm, form, melody, harmony, timbre, and texture. No prerequisites.

One Additional Lower Division GASP or ARTS course. No prerequisites.

Skills and content sequence (lower division, with prerequisites) — 8 units

Image and Sound [4 units]. Writing-intensive seminar. Students engage in close readings of multimedia “texts,” e.g., films, music videos, video games, engaging all the tools learned in the foundational sequence. The focus here is on paper-crafting, developing a focused argument, thesis statements, outlines, abstracts, and so forth. Prerequisites: Introduction to Visual Culture and Introduction to Music Studies, Writing 10 or equivalent (may be taken concurrently). This course must be taken in residence.

At least one of the following two courses:

Global Art History [4 units]. This course is a historical overview of global cultural exchange as manifested in visual expressions and materials throughout the world. This functions as GASP's secondary source research methods course in which students continue to develop skills of visual analysis. Prerequisites: Introduction to Visual Culture, Writing 10 or equivalent (may be taken concurrently).

or

Music and Society [4 units]. This course will focus on the role music plays in society. This also functions as GASP's secondary source research methods course. Prerequisites: Introduction to Music Studies, Writing 10 or equivalent (may be taken concurrently).

Upper-division requirements — 12 units

Any upper division non-studio/ensemble GASP or ARTS course [4 units].

Topics and prerequisites will vary.

Any upper division non-studio/ensemble GASP or ARTS course, or Global Art History or Music and Society [4 units].

Topics and prerequisites will vary.

Any upper division GASP or ARTS course, or any studio/ensemble course(s) totaling 4 units.

Topics and prerequisites will vary.

Senior sequence — 8 units

Theories of Expressive Culture [4 units]. Reading-intensive cultural theory seminar. Students will read and respond to advanced theoretical writings relevant to the study of expressive culture.

Students in this course will also develop a proposal for the senior thesis. Prerequisite: senior standing; Image and Sound. This course must be taken in residence.

Senior thesis [4 units]. Writing seminar and workshop for senior thesis. Prerequisite: Theories of Expressive Culture. This course must be taken in residence.

Studio/ensembles — 8 units

Music and/or dance studio/ensemble course(s) totaling 4 units, upper or lower division. Topics and prerequisites will vary.

Visual arts studio course(s) totaling 4 units, upper or lower division. Topics and prerequisites will vary.

Total units to graduate with GASP Major: 44

2.1.1 ARTS Minor

The minor in ARTS enables students to explore art from three distinct yet related approaches: history (contextual analysis of visual, architectural, and aural formats), theory (critical and creative interpretation of texts) and practice (application of techniques and concepts).

Lower Division Minor Requirements [8 units]

- One lower division GASP course
- One lower division ARTS course

Upper Division Minor Requirements [16 units]

- A minimum of four upper division ARTS or GASP courses

2.1.2 A list of potential non-GASP courses that GASP majors are encouraged to take

ANTH 110: Migration, Diaspora, and Transnational Belonging

ANTH 112: Political Anthropology

ANTH 114: Social Memory

ANTH 126: Anthropological Approaches to Gender

ANTH 130: Material Culture

ANTH 132: History of Archaeological Interpretation

ANTH 140: Cultural Heritage Policy and Practice (cross-listed w/ WH 140)

ANTH 141: Writing Narrative for Archaeology (cross-listed w/ WRI 141)

ANTH 142: Archaeology of Colonialism

ANTH 144: Archaeology of Religion

ANTH 172: Ethnohistory

ANTH 175: Ceramic Analysis

ENG 020: Introduction to Shakespeare Studies

ENG 032: Introduction to Chicano/a Culture and Experiences (cross-listed w/ CCST 060 & SPAN 060)

ENG 056: Introduction to World Drama

ENG 100: Engaging Texts: Introduction to Critical Practice (cross-listed w/ SPAN 100)

ENG 106: Early English Drama

ENG 151: Advanced Shakespeare

ENG 165: Tragic Drama

HIST 010: Introduction to World History to 1500

HIST 011: Introduction to World History Since 1500

HIST 040: History of Technology in Society I (cross-listed w/ ENGR 040)

HIST 041: History of Technology in Society II

HIST 060: The Silk Road

HIST 070: History of Islam I: From Muhammad to the Caliphate
 HIST 071: History of Islam II: From the Caliphate to the Present
 HIST 080: History of China Through the Mongol Conquest
 HIST 081: History of China Since the Mongol Conquest
 HIST 101: Visual Arts of the Twentieth Century (cross-listed w/ GASP 101)
 HIST 103: Critical Popular Music Studies (cross-listed w/ GASP 131)
 HIST 112: History of Islamic Art and Architecture (cross-listed w/ GASP 105)
 HIST 113: History of the Gunpowder Empires
 HIST 116: History of Decolonization in the Twentieth Century
 HIST 122: That's the Joint: Race, Gender, and Migration in Hip-Hop History
 HIST 123: Comparative Race and Ethnicity in the United States
 HIST 124: African American History from Slavery to Civil Rights
 HIST 126: Race and Nationalism in American Art (cross-listed w/ GASP 175)
 HIST 129: Introduction to Chicano History
 HIST 130: The Cold War, 1941-1991
 HIST 138: Topics in Visual Culture (cross-listed w/ GASP 151)
 HIST 158: Topics in Middle Eastern History
 HIST 171: Modern European Intellectual History
 SPAN 105: Hispanic Cultures I
 SPAN 106: Hispanic Cultures II
 SPAN 121: Spanish Golden Age
 SPAN 122: Spanish (Peninsular) 18-19 Centuries
 SPAN 123: Spanish (Peninsular) 20-21 Centuries
 SPAN 140: Latin American Colonial Literature
 SPAN 143: Latin American Literature since Independence
 SPAN 113: U.S. Latino/a Literature (cross-listed w/ ENG 113)
 SPAN 114: Latinos/as in Children's Literature and Film
 SPAN 115: Chicano/a Literature (cross-listed w/ ENG 115)
 SPAN 111: Empire, The Postcolonial, and Representation: Reading East & West
 SPAN 144: Caribbean Literatures and Cultures
 SPAN 131: Transatlantic Modernismo
 SPAN 145: Novel of the Latin American Dictator
 SPAN 146: Latin American Film and Fiction
 SPAN 147: Latin American Boom
 SPAN 149: The Fantastic, Magical Realism, Realism, and Testimonials
 SPAN 151: Diasporas and Exiles in Latin Am
 SPAN 153: Bilingualism and Borders in Hispanic Literatures
 SPAN 154: Hispanic Drama and Performing
 SPAN 173: Erotic Novel and Film

2.2 Program Learning Goals and Outcomes

2.2.1 Program learning goals

The program learning goals of GASP include:

1. Introduce students to the history, theory and practice of the arts in a global context.
2. Guide students in studying all fields of creative expression in cultures throughout the world.
3. Help students develop the skills they need to critically engage culturally diverse media and to explore creative processes and material connections.
4. Offer students opportunities to acquire research, creative and hands-on experiences through course projects and program-wide events.
5. Foster a new generation of critical thinkers with global and interdisciplinary perspectives grounded in rigorous acquisition of historical and theoretical knowledge.

2.2.2 Program learning outcomes and how course requirements address intended learning outcomes

The following Program Learning Outcomes (PLOs) describe the critical skills and knowledge that students in the GASP Major, as well as in arts courses, are expected to acquire upon the completion of their undergraduate education.

1. Describe visual and aural texts in technical and theoretical terms.
2. Analyze cultural, visual, aural and spatial procedures within their historical and conceptual contexts.
3. Apply theoretical models from multiple schools of thought in art history/visual studies and musicology/ethnomusicology.
4. Conduct research specific to critical studies of the arts.

PLOs 1, 2, and 3¹² are existing PLOs for the current Arts Minor and serve as GASP Major's PLOs because they are essential skills that we expect students pursuing either a GASP Major or an Arts Minor to have. PLO 4 is an addition here to highlight GASP's emphasis on research.

2.2.3 Goals across coursework, PLOs, SSHA and UC Merced

The following Curriculum Chart illustrates how the PLOs correspond with the required courses in the proposed GASP Major.

A1 = Introduction to Visual Culture A2 = Introduction to Music Studies B1 = Global Art History

¹ Slight adjustments to this PLO have been made for the GASP major.

² Slight adjustments to this PLO have been made for the GASP major.

B2 = Music and Society
 C1 = Image and Sound
 D1 = Theories of Expressive Culture
 E = Additional upper division courses in ARTS and GASP (electives)

	PLO 1	PLO 2	PLO 3	PLO 4
A1	I, D	I	I	I
A2	I, D	I	I	I
B1	D	I	D	D
B2	D	I	D	D
C1	D	D	D, M	D
D1	M	M	M	D, M
E	D, M	D, M	D, M	D, M

(I = Introduction; D = Development; M = Mastery)

The GASP PLOs support multiple SSHA undergraduate education goals in important ways. With our focus on the critical studies of visual and aural expressions, the GASP Major supports SSHA's mission of serving "regional, state, national, and international communities as a multi-interdisciplinary partner within a research-intensive public university" committed to innovative and substantive research, excellent teaching, and student-focused learning." As the GASP curriculum emphasizes helping students acquire a diverse skill set through research projects, creative presentations, and hands-on experiences (e.g. exhibition curation, recital and performance organization, symposium and event promotion), we fully contribute to SSHA's overall goal of fostering students' "intellectual growth," preparing them for "marketable, challenging careers and professions," "instilling the values of lifelong learning," and encouraging "civic responsibility, public service, and understanding in a global society."

The Global Arts Studies PLOs align with the goals of the University of California, Merced in several ways. Below we outline how the degree and its PLOs link with each of the Eight Guiding Principles of General Education.

- A. Aesthetic Understanding and Creativity: All GASP PLOs and courses help students meet this goal.
- B. Communication: In all GASP courses we stress the importance for students to acquire communications skills to be able to articulate informed arguments based on the specialized knowledge they obtain in class.
- C. Decision-Making: This is at the core of all GASP courses because all PLOs require students to make informed application of the knowledge and research findings that they obtain in all assignments and research projects. We are dedicated to teaching our students how to best use the creative and analytical tools we have given them—within the limitations we have placed upon them—specifically in order to develop their decision-making skills to the utmost.

Whenever they improvise music within a given scale, sculpt with a given material, or write an argumentative essay on an assigned topic, they are honing those skills.

D. Scientific Literacy: GASP courses cover wide-ranging topics that include the scientific history and research in visual and aural perception, artistic materials, built environment and engineering principles, and the development of digital technologies in the arts. Sound and light operate according to the laws of physics, and our perceptions of them operate on biologically as well as socially determined principles. Our students will learn how these laws and principles operate in tandem.

E. Development of Personal Potential: All GASP PLOs aim at helping students achieve academic excellence through not only acquiring specialized knowledge of the arts, but also applying their knowledge to research and creative projects that will facilitate the discovery, development and realization of their potential and strengths.

F. Leadership and Teamwork: GASP courses are structured around discussion-driven lectures and seminars, which are supplemented with collaborative assignments.

Students have ample opportunity to learn to work with their peers, resolve disagreement and conflict, share resources and responsibilities, and develop leadership skills and good work ethic.

G. Ethics and Responsibility: We teach our students to think critically about sonic and visual culture—things that society in general tells us are peripheral and unimportant, perhaps even frivolous, and yet which play a major role in constituting society itself. We believe that getting students in the habit of asking questions about fundamental things they are told they should not be asking questions about—and then answering those questions with clarity and intelligence—is critical to their advancement of human ethics on the whole.

H. Self and Society: We teach our students to understand and analyze the world around them via direct visual, aural, and corporeal impulses—channels that in all societies dominate our perceptions, and yet otherwise in scholarly discourse are so often and easily marked secondary in favor of scientific quantifiability and the black-and-white solidity of the written word.

UC Merced Eight Guiding Principles of General Education

The following chart illustrates how the GASP PLOs correspond with the eight UC Merced [Guiding Principles of General Education](#).

GASP PLOs	Sci Lit	Decision Making	Comm	Self & Soc	Ethics & Respons	Leadshp & Teamwk	Aesth & Creatvty	Pers Potntl
1	x	x	x	x	x	x	x	x
2	x	x	x	x	x	x	x	x
3	x	x	x		x	x	x	x
4	x	x	x		x	x	x	x

2.3 Assessment

Global Arts Studies faculty members have developed a full assessment plan that will satisfy the requirements for WASC accreditation, along with the new Core Competency requirements. We describe the principal components of the plan below. In the 2012-2013 academic year, the Arts minor changed its PLOs to the current four, which will be retained also for the GASP major, with one additional one to be added. In the 2012-2013 academic year, faculty members assessed PLO 4 of the Arts minor (different from PLO 4 in the GASP major). In the 2013-2014 academic year, faculty members assessed PLO 1 of the Arts minor (which will also be PLO 1 of the GASP major).

Through assessment activities in previous years, we gained insight on the sequencing of courses and cohesion of curricular training for students – core considerations in the building of the GASP major. For example, in AY 2012-2013, we identified a need to slightly alter the PLOs in order to clarify expectations for student learning in the program. Also in the same AY, we saw a need for curriculum coordination across the disciplines within ARTS-GASP to emphasize the PLO throughout the program coursework and to ensure that the PLOs are delivered in the appropriate courses. Ultimately, our experience with program assessment has allowed us to create a solid plan for the major in GASP. Previous year assessment reports from the Arts minor (for which the categories were different) will be made available upon request.

The following subsections describe the use of assessment processes from the Arts minor to also be used in the GASP major with and additional components in line with the new GASP major.

2.3.1 Timeline & Goals

We aim to use the assessment process to enhance the goals of our degree unit, improve our teaching and student learning, and increase the success of our students in their future education and labor market outcomes. We will begin implementing assessment of our GASP major in AY2015-16. PLOs 2, 3, and 4 will be assessed in AYs 2014-15, 2015-16, and 2016-2017, respectively. These three PLOs are remaining to be assessed from the previous Arts minor (earlier assessment reports are available upon request). The previous assessment results allow us to predict the ways that students in the GASP major will continue to achieve the ideals mapped-out in the PLOs and likewise benefit from the new major.

PLO 1, assessed AY 2013-14 as part of Arts Minor

PLO 2 (and aligning Core Competencies), to be assessed AY 2014-15 as part of Arts Minor

PLO 3 (and aligning Core Competencies), to be assessed AY 2015-16

PLO 4 (and aligning Core Competencies), to be assessed AY 2016-17

Once we have begun offering the senior seminar, we will evaluate our goals and our assessment tools to decide whether to continue this four-year cycle or to focus our assessment on the senior seminar projects. Continuation or alteration will depend on analyzing our own assessment methodology and student need. The GASP faculty will have one member serve as a “Faculty Assessment Organizer” (FAO) who will be in charge of facilitating our plan.

2.3.2. Evidence of Student Learning

How evidence will simultaneously serve as student learning data for exploring the PLOs and Core Competencies, how it will be analyzed, and how we will use it to improve student learning. Each year, one or more Core Competencies will be assessed along side the targeted PLO. Below, we list the Core Competencies that align with each PLO. We will meet the [accreditation requirement](#) of all Core Competencies assessed by AY 2017.

Outcome 1: Describe visual and aural texts in technical and theoretical terms.

Core Competencies: Writing Communication and Oral Communication

Direct Evidence: Student assignments. Faculty will assess student work by means of a rubric. Where work is to be evaluated in distinct disciplines (e.g., music vs. visual arts), separate, though coordinated, rubrics may be used. Where work from multiple classes within the same discipline is being evaluated at once, a control set of assignments will be read, assessed, and discussed by all faculty within that discipline in order to guarantee parity.

Indirect Evidence: We will rely on the results of the graduating senior survey administered each spring, and the alumni survey administered each summer.

Outcome 2: Analyze cultural, visual, aural and spatial procedures within their historical and conceptual contexts.

Core Competencies: Writing Communication, Oral Communication, Critical Thinking, and Information Literacy

Direct Evidence: Student assignments. Faculty will assess student work by means of a rubric. Where work is to be evaluated in distinct disciplines (e.g., music vs. visual arts), separate, though coordinated, rubrics may be used. Where work from multiple classes within the same discipline is being evaluated at once, a control set of assignments will be read, assessed, and discussed by all faculty within that discipline in order to guarantee parity.

Indirect Evidence: We will rely on the results of the graduating senior survey administered each spring, and the alumni survey administered each summer.

Outcome 3: Become familiar with multiple schools of thoughts in art history/visual studies and musicology/ethnomusicology.

Core Competencies: Writing Communication, Oral Communication, and Information Literacy

Direct Evidence: Student assignments. Faculty will assess student work by means of a rubric. Where work is to be evaluated in distinct disciplines (e.g., music vs. visual arts), separate, though coordinated, rubrics may be used. Where work from multiple classes within the same discipline is being evaluated at once, a control set of assignments will be read, assessed, and discussed by all faculty within that discipline in order to guarantee parity.

Indirect Evidence: We will rely on the results of the graduating senior survey administered each spring, and the alumni survey administered each summer.

Outcome 4: Acquire research methodologies specific to critical studies of the arts.

Core Competencies: Writing Communication, Oral Communication, and Information Literacy

Direct Evidence: Student assignments. Faculty will assess student work by means of a rubric.

Where work is to be evaluated in distinct disciplines (e.g., music vs. visual arts), separate, though coordinated, rubrics may be used. Where work from multiple classes within the same discipline is being evaluated at once, a control set of assignments will be read, assessed, and discussed by all faculty within that discipline in order to guarantee parity.

Indirect Evidence: We will rely on the results of the graduating senior survey administered each spring, and the alumni survey administered each summer.

2.3.3 Analysis and participants

The assessment of the GASP major will be based on the work of all students in their senior year. However, as the number of students in the GASP major rises, a certain number of students representing the following groups will be selected:

- Students who have expressed a primary interest in music.
- Students who have expressed a primary interest in visual arts.
- Students who have expressed equal interest in music and visual arts.

We will assess each of our PLOs during the academic year. Throughout the following summer, faculty and SSHA staff will enter the data and the faculty will produce results by the end of the subsequent fall semester (with an annual submission deadline of March 1).

Assessment Plan Activity	Who
Evidence collection	Faculty Accreditation Organizer (FAO) and at least one additional faculty member (rotates depending on which course[s] are included in the assessment plan)
Data entry	Faculty
Data analysis	FAO
Dissemination of results	FAO will distribute to all instructional staff (faculty, lecturers, TAs)
Implementation of findings to improve student learning	All faculty

2.3.4 Use of findings

Annual assessment findings have been used to improve student learning in several ways and we will continue in this tradition for the assessment of PLOs 2, 3 and 4. First, we will disseminate findings to all instructional staff, including faculty, lecturers, and teaching assistants so that they can identify areas of strength and weakness. Second, all faculty will participate in a discussion at least once a year about whether the results from the assessment

suggest ways in which we may be able to improve our curriculum, alter the curriculum content, enhance students' skill development, or change our pedagogy. Third, we will share the results with students via the website and in informal gatherings.

2.4 Samples of study for a BA degree in GASP

What follows are four sample plans of study for a BA degree in GASP. The first assumes that the student begins taking the necessary courses upon arriving at UC Merced as a freshman. The second assumes that the student begins taking the necessary courses in the sophomore year. The third assumes that the student begins taking the necessary courses in spring of the freshman year, and then spends a junior year abroad. The fourth assumes that the student is a junior transfer from a traditional community college music major.

2.4.1 Sample study plan, beginning freshman year

Freshman year (fall):

Introduction to Visual Culture

Freshman year (spring):

Introduction to Music Studies: Elements of Music

Music of Asia Pacific

Sophomore year (fall): Multimedia Studio

Sophomore year (spring): Global Art History

Image and Sound

Junior year (fall):

Critical Popular Music Studies

Nordic Dance Ensemble (2 credits) Junior year (spring):

Museums as Contested Sites

Nordic Dance Ensemble (2 credits) Senior year (fall):

Theories of Expressive Culture

Music and Society

Senior year (spring): Senior thesis

2.4.2 Sample study plan, beginning sophomore year

Sophomore year (fall):

Introduction to Visual Culture

Substances of Visual Art

Sophomore year (spring):

Introduction to Music Studies: Elements of Music

Multimedia Studio

Junior year (fall):

History of Clothing, Costume, and Fashion: Euro-centric Pre-History to 1800

Introduction to Music Theater Vocal

Junior year (spring): Global Art History Image and Sound

Senior year (fall):

Theories of Expressive Culture

Fundamentals of Three Dimensional Design

Senior year (spring): Senior thesis

History of Clothing, Costume, and Fashion: Euro-centric 1800 to 1980

2.4.3 Sample study plan, beginning freshman spring, with junior year abroad

Freshman year (spring):

Introduction to Music Studies: Elements of Music

Techniques of Interdisciplinary Research in Arts

Sophomore year (fall):

Introduction to Visual Culture

Music and Society

Learning to See in Three Dimensions

Sophomore year (spring): Global Art History Image and Sound

Architecture Design Studio: Modern Houses

Senior year (fall):

Theories of Expressive Culture

African American Music of the Twentieth Century

Senior year (spring): Senior thesis

Introduction to Vocal Jazz Repertoire

2.4.4 Sample study plan, junior transfer

Prerequisites covered before arriving at UC Merced (community college music major):

Introduction to Music: Elements of Music (= Music Theory I)

One Additional Lower Division GASP or ARTS course (= Music Theory II) Music and Society
(= History of American Popular Music)

Music ensembles, 8 credits (= Wind ensemble, four semesters)

Junior year (fall):

Introduction to Visual Culture

Learning to See: Beginning Photography

Junior year (spring): Image and Sound Global Art History

Senior year (fall):

Theories of Expressive Culture

Critical Popular Music Studies

Senior year (spring): Senior thesis

2.5. Catalog Description

The Global Arts Studies Program (GASP) at UC Merced educates students in the history, theory, and practice of the arts in a global context. The program brings together disciplines traditionally housed in different departments, including art history, visual studies, musicology and ethnomusicology, music performance, and studio art. The GASP curriculum integrates creative practice and hands-on training (ARTS 40%) with the theoretical analysis of visual, sonic, and material culture (GASP 60%). Our aim is to build an arts research program that fosters a new generation of critical thinkers with global and interdisciplinary perspectives grounded in rigorous acquisition of historical and theoretical knowledge.

The program is global in many senses of the word. We study all fields of creative expression in multiple global contexts with equal rigor, from film screen to dance club, from ritual and touristic practices to museums and concert halls. [Our faculty](#) of ethnomusicologists and art historians helps students refine the skills they need to critically engage culturally diverse media. Lecture courses, seminars, studio classes, and ensembles are designed to explore creative processes and material connections.

Working closely with faculty, our students conduct original research and acquire nuanced insights in both sonic and visual realms. Students further deepen their understanding of global arts through hands-on training in drawing, painting, sculpture, photography, music, and dance in a variety of media and cultures. GASP offers students ample opportunities to develop their professional skills by participating in community-oriented events—curating exhibitions, managing the UCM Art Gallery, and organizing recitals, concerts, and multimedia performances.

3. Annual Assessment and Accreditation

Submitted Arts Minor Annual PLO Assessment Reports are available upon request. The Reports that are available include one that is specific to the Arts Minor (AY 2012-2013) and one that overlaps with the proposed GASP major (PLO 1, AY 2013-2014). Both available reports illustrate our assessment practices and how we utilize findings.

4. Resource Needs and Plan for Providing Them

4.1 Faculty

In AY 2014-15, the core faculty for GASP will be:

1. Aditi Chandra, Assistant Professor of Art History: Islamic and South Asian art and architecture, Colonial & Postcolonial Studies, Travel and the Visual, Cinemas of India.
2. Jayson Beaster-Jones, Assistant Professor of Ethnomusicology: Music as commodity, South Asian popular music.
3. David Kaminsky, Assistant Professor of Ethnomusicology: Swedish Folk Music and Dance, Music and Identity.
4. Duniya Ramacova, Professor of Art History; History of Costume, Ethnic Costume, Design
5. ShiPu Wang, Associate Professor of Art History: Twentieth-Century Euramerican Art with an Emphasis on Diasporas, Race and Nationalism.
6. Ken Yoshida, Assistant Professor of Art History: Postwar Japanese Art, Film Studies and Critical Theory.

Ethnomusicology/Critical Musicology

Our goal is to fill one more area of critical need in an integrated curriculum: music/sound studies in relation to digital technology. A new faculty hire with expertise in sound and music as it relates to digital technology will bridge a number of intra- and interdisciplinary gaps and be a valuable resource for both our graduate and undergraduates. They will round out our strengths in film and media studies, which are currently weighted toward the visual end. They will foster interdisciplinary connections via the digital humanities, and bring in new perspectives on new technologies as mechanisms for the globalization of musical experience. Moreover, they will help prepare our students for new sociotechnological developments both inside and outside of academia.

4.1.1 Teaching rotation

We can initiate the major with six faculty members in Global Arts Studies: two in music and four in visual arts. An additional music faculty member in the following year would help us to offer the full range of senior courses, and graduate our first GASP majors. If a tenure track line is not available, a lecturer would also serve.

A future expansion in faculty would further allow us to offer (a) all of our required courses once per semester, (b) a robust selection of upper-division courses in both music and visual arts, and (c) a selection of service courses for the general student body.

In addition, we would be able to offer regular graduate courses, and to function as a strong pool of advisers and committee members for graduate students interested in doing work in both music and visual arts.

The chart outlines a potential teaching rotation for the required GASP courses with our current five faculty in place in the first year, and a sixth in the second (if we are unable to hire a sixth faculty member, the additional load could be covered by a lecturer). It follows our current three-course teaching load. The rotation allows each student to take at least one course with each of the GASP faculty.

AC (Aditi Chandra), JBJ (Jayson Beaster-Jones), DK (David Kaminsky), KY (Ken Yoshida), SPW (ShiPu Wang), and DR (Dunya Ramicova).

A1 = Introduction to Visual Culture

A2 = Introduction to Music Studies

B1 = Global Art History

B2 = Music and Society

C1 = Image and Sound

D1 = Theories of Expressive Culture

D2 = Senior Thesis

E = Additional upper division GASP and ARTS courses (electives)

F1 = Fall 1st Year S1 = Spring 1st year F2 = Fall 2nd Year S2 = Spring 2nd Year

	AC	JB	DK	KY	SPW	DR
A1	/	/	/	F1	/	
A2	/	/	F1	/	/	
B1	F1	/	/	/	/	
B2	/	/	F1	/	/	
C1	/	F1	/	/	/	
E	F1	/	/	F1	F1	F1

	AC	JB	DK	KY	SPW	DR
A1	/	/	/	/	S1	
A2	/	S1	/	/	/	
B1	/	/	/	/	/	S1
B2	/	/	S1	/	/	
C1	/	S1	/	/	/	
E	S1	/	/	S1	S1	S1

	AC	JB	DK	KY	SPW	DR
A1	/	/	/	F2	/	/
A2	/	F2	/	/	/	/
B1	F2	/	/	/	/	/
B2	/	/	F2	/	/	/
C1	/	/	/	/	/	F2
D1	/	/	F2	/	/	/
E	/	/	/	F2	F2	F2

	AC	JB	DK	KY	SPW	DR
A1	/	/	/	/	S2	/
A2	/	S2	/	/	/	/
B1	/	/	/	S2	/	/
B2	/	/	S2	/	/	/

C1	S2	/	/	/	/	/
D2	/	S2	/	/	/	/
E	S2	/	/	/	S2	S2

4.2 Needs for specialized staff

ARTS and GASP collectively serve over 1,100 students per academic year in classroom settings alone—the number is of course greater when expanded to include audience members, event attendees, and gallery patrons. Much of this service goes beyond classroom teaching and advising to include space, resource, and equipment management; as well as exhibition, event, and concert planning. As the Arts grow at UC Merced, so will these responsibilities. Already the administrative burden is beyond what we consider reasonable for faculty, and our lack of dedicated staff severely limits the services we are able to provide to students and community.

Ideally, we would like to have two ARTS LPSOEs in place by the time we begin to offer the GASP Major in Fall 2016. One would be in music, the other in visual arts, and each would have a two-course reduction to shoulder the administrative burdens of their respective fields—coordinating and managing ARTS and GASP schedules and lecturer/curricular requests, managing equipment and space, and so forth.

One LPSOE will offer ARTS or GASP courses related to digital humanities and/or museum studies, two areas of focus in the Interdisciplinary Humanities Graduate Program. In addition to administrative responsibilities, the LPSOE will also assist in managing the UCM Art Gallery programming through teaching one to two courses in museum studies, with GASP faculty's input and involvement. The Gallery has offered shows that are interdisciplinary in content and presentation, and the LPSOE will continue to organize exhibits that explore intersections of digital, visual, aural, and performative arts—the research interests of several Interdisciplinary Humanities Graduate Program faculty.

The other LPSOE will teach classes in sound recording, mixing, and digital music. The LPSOE will also manage the media lab, music practice rooms, and film viewing stations --particularly for the required Image and Sound course. The LPSOE will be able to become an important contributor to a proposed HumLab that offers tools and training for faculty and graduate students working on public humanities projects.

If resource allocation does not allow the hiring of two LPSOEs by 2016, the abovementioned administrative functions could be handled by a single full-time dedicated staff person, until such time as those resources do become available.

4.3 Specialized space needed

To fully support an integrated curriculum in GASP, we need the following specialized spaces:

- A multimedia room with viewing stations equipped with computers that could handle video and sound editing. As these files tend to be large in size, computers with large amounts of RAM and fast CPU are essential. The Center of Humanities is creating a

multi-media production work station, and some computers have begun to be tasked in this way in the SSM student computer lab.

- A recording studio with separate mixing booth, soundproofed, ventilated, and equipped with mixing board, microphone setup, and cables. Creation of this space is currently in process (SSM 122 is being adapted for this purpose).
- A combined music and dance rehearsal space, soundproofed and outfitted with dance floor and mirrors. Creation of this space is currently in process (SSM is being adapted for this purpose).
- An additional studio art classroom will greatly alleviate the current burden of using only one classroom for all courses regardless of the art medium under study. As divergent materials are used in these classes, it is of paramount importance, for the health of the students and instructors, to be able to use separate chemicals (e.g., those found in paints) in different spaces.
- Several well-ventilated and temperature-consistent storage rooms for musical instruments, media equipment such as video cameras, hard drives, microphones, and other necessary devices, and potential art collections. SSM 152 is currently being adapted for this purpose.

4.4 Library resources

We are currently working with the library to implement a digital streaming service that would allow students to view films assigned in class.

We are also in the process of increasing the book collection in the library as texts in the areas we teach are lacking at present. The library staff have been forthcoming and have started ordering books that are not already available as e-texts.

5. Potential for non-Majors to participate

There is a fairly large number of Arts Minors at UC Merced, numbering at about 60-70 in the past two years, who will naturally gravitate towards the GASP major. However, the inherent interdisciplinarity of both art history and musicology will naturally allow for GASP courses to be of interest to non-Majors. For example, students of Chinese, Islamic, or American history will profit from an engagement with the arts and music of those cultures. Anthropology AND Archaeology students will no doubt be interested in the study of pre-modern art and architecture. English majors with interests in theater and performance studies can broaden their education by taking GASP's performance-focused courses that engage both music and theater. GASP Courses on aesthetics, race, and national identity will appeal to Philosophy and Political Science Majors. Courses in visual arts and music will be useful for Cognitive Science majors keen to learn about the impact of images and sound on the brain. GASP majors will also be enriched by their interactions with students in all of these various fields.

If potential majors are unable to take required courses due to overenrollment, the program will generate major-only sections of those courses. However, we do not anticipate this as a problem in the first few years of the major.

6. Timetable for implementation

We propose implementation of the GASP Major in Fall 2016. Students with Freshman, Sophomore, or first-semester Junior standing in Fall 2016 would be allowed to change their major to a GASP Major, per the UC Merced Change of Major Policy. Students with second-semester Junior or Senior standing as of Fall 2016 will not be able to declare GASP as a major. Transfer students will be allowed to enter the program as of Fall 2017.



SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS

UNIVERSITY OF CALIFORNIA, MERCED
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November 7, 2014

To: GASP Major Proposal Faculty

Re: GASP Major Proposal

On October 29, 2014, the School of Social Sciences, Humanities and Arts Curriculum Committee met to review and discuss the submitted GASP Major Proposal. We received the major at our first meeting, on September 29, and postponed discussion until October 29, when all members would have had time to read and analyze the proposal fully.

The CC wants to congratulate you on an innovative and fresh approach. While some of us have concern about proposing any new major in the current UC climate, as many of us had a strong feeling that a UC campus without an arts major should not exist. With both in mind, we look and respond to your proposal with a view to its necessity and ways to make it function.

First, and technically, Megan Topete has adjusted the courses on pages 8 – 9, in section 2.1.2, to remove courses that do not exist in ENG and to add cross listing when appropriate. You might also reach out to faculty in majors within SSHA and beyond to expand your list. Megan also pointed out that the Arts Minor is listed incorrectly in the GASP Major Proposal. It does not match the [general catalog](#). We have concerns that UGC will delay your proposal because of this error. The committee also expressed concern over the teaching rotation chart included in the major, since it does not list classes and is thus less clear than it could be on how and which faculty will deliver the courses this ambitious major requires.

Our other concerns fall into the area of resources, especially in terms of projected needs for faculty, growth, and space.

As to the first, the committee expressed a desire for you to be clearer on your hiring needs/expectations. Specifically, on p. 17 the major proposal says “it is crucial to have an additional ethnomusicologist or critical musicologist join us by the time the GASP Major is offered.” But it backtracks quite soon to “FF as of year 2 or a lecturer.” Basically, this raises the question: is the hire crucial or not? But more broadly, it asks the question of if the major can launch in the current hiring climate. If funding is not available for a faculty search or lecturer hire, how will the major function? Working on the basic question of whether students can get the courses they need when the major launches, a concern all new majors face, the committee also expressed concern over class size, student faculty ratio and teaching load. Given that the courses in the major will more than likely attract non majors, will there be room in classes and faculty enough to serve the needs of majors? In the most basic iteration, if the major launched now, would existing faculty and lecturer

FTE be enough?

Beyond the major's launch, the CC has some concern over its optimistic growth projections. Will GASP faculty be reaching out to non UCM faculty and community partners, both of which can augment the current structure? With the potential non major appeal of many courses, the CC discussed the idea that some UCs make courses in performing arts for majors only to help manage the balance. The committee also wondered about GASP's potential following of the PSY and SOC slow growth pattern, which PSY structured so that GE courses are reserved for majors and minors by adding a pre req. Finally, the committee would like some assurance of how the major will function if it does not grow to the robust ten member faculty it ideally projects.

Growth needs also seem projected around space expansion. In 4.3, the major specializes space needs. Please clarify which items on the list have been provided and which have not and how the major will move on should specifically listed items not in existence not come to fruition.

The committee expressed a general concern for the workload projected for the LPSOE and urges GASP to think of associate director designation. LPSOEs can take administrative positions, and a clearer explanation of how GASP'S would do that, administratively, will make their projected work load justification clearer.

Overall, the committee hopes you will address our concerns and looks forward to a response sent to Megan Topete (mtopete@ucmerced.edu) no later than Friday, December 5. We are impressed by the scope and ambition of your proposal.

Sincerely,

Jan Goggans
Chair, SSHA Curriculum Committee

CC: James Ortez, Associate Dean, SSHA
Megan Topete, Manager of Instructional Services, SSHA
Morghan Young Alfaro, Manager of Student & Program Assessment



SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS
GLOBAL ARTS STUDIES PROGRAM

UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CA 95343

December 1, 2014

To: SSHA Curriculum Committee

Re: GASP Major Proposal

GASP faculty met on November 21 to address the concerns of the November 7 memo from the SSHA curriculum committee. We made a number of adjustments to the proposal that we hope will address the concerns of the committee. These changes include:

- 1) In section 2.1.1, the description of the Arts Minor in the proposal was adjusted to match the catalog description of the minor.
- 2) In section 4.1, Dunya Ramicova was added to the list of core faculty; language indicating the immediate need for an additional musicologist was removed.
- 3) In section 4.1.1, Dunya Ramicova was added to teaching rotation. Additionally, GASP faculty noted that a list of classes and key were included in this section above the table and abbreviations for these classes are used in the table, which should clarify confusion about reading the teaching rotation schedule.
- 4) In section 4.4.1, the language about future faculty was adjusted in order to compensate for the current hiring climate at UCM. As such, the proposal should now indicate that there are sufficient faculty to begin the major, even as it points to future faculty needs (i.e. a musicologist).
- 5) In section 4.2, LPSOE faculty positions were each given a two-course reduction to compensate for heavy administrative burden.
- 6) In section 4.3, added language to the description of specialized spaces that indicates which spaces are already being adapted for GASP needs. At the present time, all but one of these spaces are in process.
- 7) In section 5, added language that indicates that major-only sections will be created in the case of overenrollment of core GASP classes.

Please let us know if you have any other suggested changes to the proposal.

A Proposal for a program of graduate studies in

Public Health

for the Ph.D. and MSPH Degrees

University of California, Merced

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Executive Summary:

The purpose of this proposal is to describe the rationale for UC Merced to establish a Doctor of Philosophy (Ph.D.) in Public Health. The vision to promote Public Health at UC Merced was first articulated by UC Merced faculty and administration in the Strategic Vision of 2009. Since that time, we have taken great strides to achieve this vision, including introducing an organized research unit dedicated to promoting health research (the Health Sciences Research Institute), introducing an undergraduate major and minor in Public Health, and continuing to promote the development of medical education in the region (the San Joaquin Valley PRIME program). The vision to promote health research and education through 2020, including Public Health, has recently been articulated in the Human Health Sciences proposal as part of the Strategic Academic Focusing (SAF) initiative currently ongoing at UC Merced. This proposal describes a number of concrete steps the campus can follow to continue to develop health related research and education on campus, including introducing a research doctorate in Public Health.

The proposed focus of the Ph.D. in Public Health - Prevention Sciences - builds on the expertise of our faculty, the resources on campus, and our unique position of being located in a rural, underserved, ethnically diverse region. Specifically, the program focuses on training students to conduct research aimed at preventing chronic and infectious diseases in rural, underserved, disadvantaged, ethnically diverse communities. The program will emphasize the role of transdisciplinary approaches to addressing public health challenges, and train students to conduct and disseminate their research to diverse groups, including community members and organizations, healthcare providers, and policy makers. Our program aims to successfully place graduates in tenure-track jobs in academia, or research positions in industry, government, or non-governmental organizations.

While other programs in the University of California system offer training in Prevention Sciences, including chronic and infectious diseases, our program is unique in making transdisciplinary approaches to addressing problems of vulnerable and diverse populations in rural settings, which is the focus of the training students will receive during their study. This approach, developed by faculty on campus starting in 2009, utilizes the existing strengths on campus, including resources and expertise in translational sciences and transdisciplinary research (e.g., HSRI, the Blum Center, and ReCESS), experience in conducting transdisciplinary and collaborative research with communities, healthcare providers, and policy makers to address the health challenges facing rural, underserved, ethnically diverse communities, and the interests of our targeted students.

We expect to admit 7 students per year. Based on our consultations and market research, we expect to attract students seeking training in conducting research relevant to rural, underserved, and ethnically diverse regions of the county and the world. Initially, we expect our prospective students to come from three sources: graduates with an MPH from California State University campuses across the state, undergraduates in institutions in the San Joaquin Valley, and health professionals in the San Joaquin Valley. As the program develops, we anticipate attracting students from other areas of the US and other counties. Thus, we do not expect to compete for students with the existing programs in the UC but rather see our program as adding to the options available to students interested in studying Public Health within the UC system.

Funding for the students will come from teaching assistantships and graduate research assistantships. The existing facilities at UC Merced will support the graduate students, including sufficient laboratory space and computing resources. The faculty associated with the Public Health Graduate program has demonstrated success in attracting external funding. In addition, we will actively pursue training grants to support graduate students. To the extent that our prospective students are similar to the current composition of UC Merced students (45% Hispanic, 6% African American, and 25% Asian; 60% first generation college students), and given UC Merced's designation as a Hispanic Serving Institution, we anticipate being well placed to attract training grants to support our graduate students.

In proposing the Ph.D., we have taken a measured approach by ensuring that the current program could be offered with existing resources. Specifically, we currently have sufficient faculty to train and supervise students, sufficient laboratory space to house graduate students, and sufficient funding to support the students. The proposed program does not require accreditation. While all other UC campuses with Public Health programs offer a similar research based degree, our program is distinctive and thus we expect to attract graduate students interested in conducting research in rural, underserved, and ethnically diverse communities. As the program develops, we will assess whether to expand our offerings to include other areas and offer an accredited MPH, with the decision being determined by student demand, the number of new positions that are allocated to Public Health, the outcomes of the SAF initiative, and consultation with the faculty, Provost, Dean, Senate, and Graduate Council.

Section 1: Introduction

1.1 Aims, Objectives, and Distinctive Features of the Program

Public Health is a transdisciplinary area of research and study that focuses on measuring, understanding and improving the health of the population, including assessing the health needs of vulnerable populations, understanding the causes and determinants of health challenges and problems, and identifying ways to improve the public health system and the health of the population. Our goals in establishing a Ph.D. in Public Health at UC Merced are to i) attract high-quality graduate students who are interested in conducting research relevant to underserved and vulnerable populations, ii) provide world-class training in research aimed at preventing chronic/infectious diseases and promoting healthy development in underserved and diverse populations, iii) provide training in transdisciplinary research and in translating and disseminating the research to diverse groups, including community members and organizations, healthcare providers, and policy makers, and iv) successfully place graduates in tenure-track jobs in academia, or research positions in industry, government, or non-governmental organizations.

Our program is distinctive in several respects. First, while other programs in the University of California system offer training in Prevention Sciences, including chronic and infectious diseases, our program will emphasize transdisciplinary approaches to addressing problems of vulnerable and diverse populations in rural setting. In this light, our location in the San Joaquin Valley (SJV) is relevant because it affords the opportunity, as well as the obligation, to find innovative ways to address complicated health issues. Merced was chosen as the site of the latest University of California campus in part due to the recognition of the high levels of poverty and health disparities that exist in the SJV, a region comparable to the poorest parts of Appalachia.¹ The region includes the urban center of Fresno, with more pockets of intense poverty than any other U.S. city, and also low-wage farm and service-related regions with significant ethnically diverse communities.² The eight counties in the SJV rank among the lowest in the state in both health outcomes (mortality and morbidity) and the factors that contribute to health (social and economic factors, and physical environment).³ The region suffers from a lack of investment in Local Health Departments, the traditional safety nets in the region,⁴ and includes numerous communities that are federally designated as a Health Professional Shortage Area (HPSA). The lack of access to routine preventative care contributes to the much higher than average prevalence of chronic diseases in the SJV.

The problems facing the communities in the SJV are not unique, for there are rural, underserved, ethnically diverse communities throughout the US and the world that face similar health challenges. What is unique is to find a new research university, one whose mission includes "fostering and encouraging

¹ Congressional Research Service (2005). *California's San Joaquin Valley: a region in transition*. Retrieved March 1, 2011 from: www.house.gov/nunes/documents/San_Joaquin_Valley_CRS_Report.pdf.

² Capitman J, Riordan G. Growing a healthier San Joaquin Valley. Retrieved on February 27, 2011 from: www.csufresno.edu/ccchhs/documents/CVHPI_recomend0107.pdf.

³ [University of Wisconsin Population Health Institute](http://www.countyhealthrankings.org). County Health Rankings. Retrieved on March 30, 2011 from: www.countyhealthrankings.org

⁴ Weiner J, Carlson K. Special Report: Healthcare at crisis status in Stanislaus County. Retrieved on 18 March, 2011 from: www.sacbee.com/2011/02/19/3416837/special-report-healthcare-out.html

cross-disciplinary inquiry and discovery" with its "location in the San Joaquin Valley, reflecting the poetry of its landscape, history, resources and diverse cultures" making it a "natural laboratory," located in a region with a significant population (4 million people) that has no research university to provide Ph.D. level training to students interested in Public Health. Our vision is to for the SJV to serve as a natural laboratory in which to train Public Health students to conduct relevant research with underserved and disadvantaged groups in rural, underserved areas. The training the students will receive will be pertinent to other areas and regions, whether they are in California, other parts of the US, or in other places in the world. The benefits that people of the SJV will receive will help eliminate the health disparities in the region while providing evidence on how to reduce health disparities in other rural, underserved, ethnically diverse regions.

The need for public health training at UC Merced has been recognized both at UC Merced and the Office of the President. UC Merced's Strategic Academic Vision (2009) included "Human Health" as a major theme, with three objectives: 1) to establish the Health Sciences Research Institute (HSRI), 2) establish a School of Medicine, and 3) evaluate the potential for a School of Public Health. By Fall 2014, faculty at UC Merced have made significant progress towards meeting the objectives laid out in the 2009 Strategic Academic Vision, including (a) establishing the Health Sciences Research Institute (with 80 affiliated faculty members, the largest ORU on campus), (b) participating in the development of the San Joaquin Prime Program for medical education, (c) proposing the establishment of Public Health Bylaw 55 unit with 20 Core, Active, and Affiliated members, and (d) contributing to the establishment of health science programs at the undergraduate level through the introduction of an undergraduate major and minor in Public Health. The establishment of a Ph.D. program in Public Health is integral to establishing a firm program in Human Health that is consistent with the 2009 UC Merced Strategic Academic Vision.

The need for additional graduate education in Public Health at UC Merced has also been recognized by the Office of the President. A 2009 report from the University of California Office of Health Affairs encouraged UC Merced "(t)o address both regional needs and student interests, possible future development of new programs in other health professions, including perhaps programs in nursing and public health, where regional needs also exist."⁵ That same report also recommended a 50% increase in doctoral students across the UC system in Public Health by 2020.⁶ This sentiment has been echoed in the report *Public Health Education and the University of California*, which noted that while there is a growing demand for a more educated public health research work force at the national level, California is plagued by a limited applicant pool for trained public health professionals.⁷ In particular, there is a need for graduate programs in public health research that can train students to address contextual health issues associated with the demographic and epidemiological shifts taking place in California. Our proposed

⁵ Page 17. Office of Health Affairs. A COMPELLING CASE FOR GROWTH: *Special Report of the Advisory Council on Future Growth in the Health Professions*. University of California Office of the President. 2009.

⁶ Ibid. Page 18.

⁷ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2004. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf, page 12.

Ph.D. program will address this gap by training Public Health researchers to address the health problems of vulnerable populations, particularly in rural and underserved areas.

The proposed Ph.D. in Public Health is also consistent with the stated goals of the Human Health proposal recently submitted as part of the Strategic Academic Focusing (SAF) initiative at UC Merced. The Human Health proposal represented a consolidation of four proposals: Public Health, Healthy Development (Psychology Department), Molecular and Cell Biology, and the Health Sciences Research Institute. Together, these proposals represented nearly 50% of the faculty on campus, with a nearly equal number of faculty from each of the three schools. The proposal reflects the fact that Human Health research and education are well established as a major theme at UC Merced. The investment that the campus has made to arrive at this point is already bearing fruit, as health is the single largest concentration of grant funding and publications on campus. Public Health is an integral part of this proposal.

Our proposed graduate program in Public Health will train students to conduct research aimed at preventing chronic and infectious diseases in rural, underserved, disadvantaged, ethnically diverse communities. We will achieve this goal by drawing upon the latest innovations in Prevention Sciences regarding community engaged research and scholarship to train students to work with diverse populations in underserved communities. The training will emphasize the role of culture and the physical environment on health behavior, the importance of transdisciplinary approaches, community based participatory research, and translational research to address health disparities, and how to disseminate the results to diverse communities. Our program is designed to prepare students for research careers in both the academic and non-academic labor markets. It will focus on providing its graduates with the necessary theoretical and quantitative skills to excel in the study of contemporary Public Health theory and policy. Our graduates will help fill the need for trained public health researchers in both the public and private arena. In addition, our program will help to fill the need for faculty members to train the next generation of public health researchers. The Ph.D. program is designed to be full-time, and we do not plan to accept students seeking to attend on a part-time basis. The MSPH degree will be offered as an option for students admitted to the Ph.D. program.

1.2 Historical Development of Field and Departmental Strength in Field

Training and education in Public Health has a long history within the United States and around the world.⁸ Although Public Health education traditionally placed great emphasis on epidemiology and detection of disease, Public Health education is now much broader, encompassing a wider range of areas including health promotion, health psychology, medical sociology, medical anthropology, health economics, health communication, infectious disease control, environmental health, public health genetics, health policy, and health management, to name only some of the areas. This expansion of the scope of Public Health reflects the recognition that many of the problems facing society, such as gun violence, tobacco use, motor vehicle deaths, and obesity result from the intersection of individual, local, national, and global factors that require multipronged approaches developed by researchers from a range

⁸ Rosen, George. *A history of public health*. JHU Press, 1993.

of disciplines.⁹

There are two different categories of Public Health degrees: professional and academic.¹⁰ Professional degrees, including the Master of Public Health (MPH) and the Doctor of Public Health (DrPH), are oriented towards practice in public health settings. Research degrees, including the Masters of Science in Public Health (MSPH) and the Doctor of Philosophy (Ph.D.) in Public Health, place more emphasis on research and thus are seen as more academically based. Professional doctoral degrees (DrPH) are only provided by accredited programs in Public Health, while research based degrees can be offered by either accredited or non-credited programs. In the UC system, UCLA, UC Davis, UC Berkeley, UC Irvine, and UCSD (jointly with SDSU) all offer MPH degrees and Ph.D.'s in Public Health, but only UC Berkeley and UCLA offer a DrPH. An MPH degree is not required for a Ph.D. in Public Health, though most universities choose to offer a terminal MPH degree because of the high student demand.

Public Health recognizes five core areas within the discipline – i) epidemiology, ii) statistics/biostatistics, iii) health services research and policy, iv) social and behavioral health, and v) environmental health. All five areas are important and relevant to focus the proposed graduate program at UC Merced on Prevention Sciences. In Public Health, Prevention Science programs generally focus on health promotion and disease prevention, emphasizing the need to create policies and programs (interventions) prior to the manifestation of diseases or health problems within individuals and populations,¹¹ and the distribution of such outcomes within the group.”¹² Prevention Sciences incorporates the core Public Health areas of health services research and policy; social and behavioral health, epidemiology, and environmental health, which are all strengths of the current faculty at UC Merced. Prevention Sciences is a broad area that can be addressed by researchers from all five core disciplines in Public Health.

When making this decision the faculty considered a number of factors, including the opportunities for students to receive superior training at other UC campuses, the strengths of the faculty at UC Merced, the likely evolution of Public Health research and education, project demand and interests of prospective students, and the opportunities for these students to obtain tenure track positions in academia. The faculty has chosen to take a measured approach by introducing a program that focuses upon one area (Prevention Sciences) initially, and then determining whether to expand the scope as student demand, institutional support, and experience dictates. This decision was also made in consultations with prospective employers (e.g., academic institutions and local Public Health Departments), colleagues at other institutions, and areas of faculty research. A summary of the factors that we considered when deciding on

⁹ See, for instance;

Mozaffarian D, Afshin A, Benowitz NL, et al. Population approaches to improve diet, physical activity, and smoking habits. *Circulation*. 2012;126(12):1514-1563.

Hemenway D. The public health approach to motor vehicles, tobacco, and alcohol, with applications to firearms policy. *J Public Health Policy*. 2001;22(4):381-402.

¹⁰ Schools of Public Health and Public Health Programs". Council on Education for Public Health. http://ceph.org/assets/Master_List.pdf. Accessed on November 30, 2014.

¹¹ Degree Programs in Prevention Science February 2013. Society for Prevention Research.

<http://www.preventionresearch.org/Degree%20Programs%20in%20Prevention%20Science%20February%202013.pdf>

¹² Kindig D, Stoddart G. What is population health. *AJPH* 2003;93(3):380–3

the focus of our program are:

- ***Strengths of UC Merced in comparison to other UC campus*** - The UC system is blessed with some of the finest Public Health researchers and educational programs in the world. Our program is unlikely to be as large or expansive as the programs at our sister campuses anytime in the near future. However, we feel that by offering a program that utilizes our relative strengths, we can increase the options available to students interested in studying within the UC system.

One strength is the diversity of our faculty and transdisciplinary nature of much of our research. Though we are a growing campus, the relative lack of institutional silos has created an environment in which transdisciplinary research is common. This is partly due to the fact that many of the research issues we address require a transdisciplinary approach, and partly because of necessity: As a relatively small campus, our colleagues are likely to come from other disciplines. The campus has recognized this diversity and need to emphasize transdisciplinary research as a strength, and is actively working to ensure that transdisciplinary research and teaching is supported on campus. Indeed, when hiring new faculty, a key factor that we consider is the ability of the candidate to work with others outside their field. As a result, all members of the Public Health group are committed to transdisciplinary research. While we acknowledge that transdisciplinary research is alive and well at other UC campuses, we feel this is a particular strength at UC Merced.

A second strength at UC Merced is our focus on and experience with conducting community based participatory research (CBPR). For instance, the Health Sciences Research Institute (HSRI), the largest organized research unit on campus, is dedicated to promoting transdisciplinary and community engaged research among faculty, including sponsoring the development of a Translational Research Center that involves a range of community and healthcare provider stakeholders. In addition, two other research institutes - the Blum Center and the Resource Center for Community Engaged Scholarship (ReCESS) - actively support community members and train faculty to work with community partners to develop research questions, implement studies, and disseminate research results to change practice and behavior. While CBPR is well established at many of the UC's, research that engages community stakeholders has been actively supported at UC Merced. Our proposed curriculum builds upon our faculty's expertise in community-based and community-engaged scholarship, and will produce graduates with particular expertise in mixed methods methodologies and the theoretic basis with which to conduct relevant research.

- ***Strengths, interests and expertise of faculty*** - The faculty associated with the proposal come from a range of backgrounds, including health disparities, Latino/a health, epidemiology and social epidemiology, health psychology, medical anthropology, health economics, health communication, infectious disease, immunology, environmental health, public health genetics, and behavioral health. At the same time, most have significant experience in Public Health either

through formal training (a number have MPH degrees or have engaged in Public Health postdoctoral training), by having previously worked in Schools of Public Health or Medical Schools, and by engaging in Public Health research. As a result, the faculty is well versed in Public Health research and training. We feel that our diversity and commitment to work cooperatively to develop a program with a transdisciplinary focus in which students learn to approach health problems from a number of different perspectives is a strength of our proposal. While the students will ultimately conduct research relevant to the prevention of chronic and infectious diseases, they will benefit from having been trained to work across disciplines and with diverse teams of researchers.

- ***Evolution of Public Health research and training*** - There is much debate regarding the appropriate training of the public health workforce.¹³ Our assessment is that addressing Public Health problems will increasingly require researchers to take a multipronged approach, including addressing the underlying social determinants of infectious and chronic diseases. Rather than 'quick-fixes' or single-prong solutions, addressing current health issues will involve sustained efforts to communicate health risks in order to change behaviors and the environments in which vulnerable communities live. In addition, the advent of the Affordable Care Act (ACA) means that many people who previously had only limited access to health care will, in principle, have greater opportunities for care. However, increased opportunities for access do not necessarily translate into increased utilization. Research is needed to find ways to improve access to culturally appropriate services in rural, underserved, ethnically diverse communities. In addition, the ability of healthcare systems in underserved areas to meet the needs of the diverse populations I raises concerns about the adequacy of the safety net. Concerted efforts will be needed to ensure that providers are providing culturally appropriate care. Finally, changes in the physical environment and the interaction between genetics and the environment are being increasingly important to our efforts to understand the determinants of health and develop new approaches to preventing chronic and infectious diseases. Taken together, our assessment is that students must be trained to understand the myriad of factors that influence health and health behaviors, to take a transdisciplinary approach to addressing these problems, to understand how to work in a diverse research team, and to understand how to translate their findings into action. This assessment has guided the development of this graduate proposal.
- ***Projected student interest*** - An indication of the types of graduate students we might attract is the composition of the existing student body at UC Merced. As of the start of 2014, UC Merced had 6,268 students, including 5,884 undergraduates and 384 graduate students. Approximately 39% of the students come from the Central Valley, 35% from the Los Angeles area, and 25% from the

¹³ See, for instance, the special edition of the American Journal of Preventive Medicine, The Public Health Workforce, Edited by Fátima Coronado, Denise Koo, Kristine Gebbie, November 2014, Volume 47, Issue 5 , Supplement 3, S275-S394, and Spencer H. Framing the Future: The Second 100 Years of Education for Public Health. Presented at the Teaching Prevention Workshop, Association of Schools of Public Health, 2012, Washington, DC .

greater Bay Area. These students are interested in engaging in research (UC Merced has the highest percentage of undergraduate research involvement among any of the UC campuses). In our survey of undergraduates at UC Merced, students express a particular interest in being involved with research that directly benefits the communities in the SJV, including working directly with community groups or area providers. To the extent that this is reflective of the type of graduate students who will be attracted to study Public Health at UC Merced, our prospective students are likely to want to engage in research relevant to rural, underserved communities.

The student base is a particular strength of UC Merced. A Hispanic Serving Institution (HSI), our current student population includes 60% first generation college students, with stated ethnicities that match the composition of young people across California - 45% Hispanic, 6% African American, and 25% Asian. To the extent that this reflects the type of students we are likely to attract, the indications that our current students are interested in engaging in research relevant to rural, underserved communities, and given our location in the diverse San Joaquin Valley, the highly diverse undergraduate student population, and the population of students obtaining their MPH at CSU Fresno (with whom we are coordinating our program), the proposed Public Health program will almost certainly serve to increase the population of underrepresented groups in the discipline.

At the present time, there are six graduate students enrolled to study Public Health through the Individualized Graduate Program (IGP) with an emphasis on Social Science (hereafter: Social Science Graduate Program). All students previously had a Masters or clinical degree, and professional experience relative to Public Health, and expressed interest in conducting research relevant to the communities in the San Joaquin Valley. Two of the students are Assistant Professors in nursing at a local California State University campus, one is a Director of Public Health Department in a county in the San Joaquin Valley, one is a medical doctor returning to pursue a research degree, and two are recent graduates with a Masters in Public Health from California State University, San Francisco.

- ***Attractiveness of graduates to employers/academic institutions*** - For our graduates to obtain tenure-track jobs in academia or research positions in industry, government, or non-governmental organizations, they must be able to show an active research agenda with an impressive publication record, provide evidence of their ability to communicate and teach basic concepts in Public Health, have an expertise in a particular discipline and methodology relevant to Public Health, and have the potential to achieve external funding. When developing the program, we aimed to give the students numerous opportunities to publish their work (i.e., requiring their second year thesis and qualifying paper be of publishable quality), have teaching experience (i.e., require at least two semesters of teaching assistantships), and demonstrate an expertise in their research area (i.e., by attending and presenting at international conferences). Where possible, we have attempted to minimize requirements that are not directly related to achieving these ends.

- ***Measured approach*** - The ultimate size and scope of the Public Health Ph.D. program at UC Merced will be determined by student demand, the number of new positions that can be allocated to Public Health, and the outcomes of the SAF initiative. We have taken a measured approach when proposing this new graduate program by ensuring the proposed program can be offered using only existing resources if necessary. That is, the program being proposed is a research based Ph.D. in Public Health that does not require accreditation from the Council on Education for Public Health and involves courses that can be offered with existing faculty resources. The only additional resources that are asked for are library resources, and while faculty across the university would benefit from their addition, the existing faculty has been operating without them. Thus, this proposal does not require any significant new resources.

We have also chosen to focus on an area in Public Health - Prevention Sciences - in which we currently have significant strength at UC Merced. The importance of Prevention Sciences was recognized by the Senate in 2011 when then Provost Alley approved, at the Senate's bequest, a Strategic Hire in Prevention Sciences. Then Provost Alley asked the Dean of Social Sciences, Humanities and Arts to administer the position, and the Dean then asked the Public Health faculty to lead the search for the ideal candidate and be a home for the position. The search for the candidate has now been completed; with Nancy Burke from UCSF-Fresno being offered the position (anticipated starting date of July 2015). The addition of Dr. Burke as a senior colleague will augment our existing strengths in Prevention Sciences. In addition, our consultations with regional stakeholders (e.g., Directors of the Public Health Departments in the SJV, faculty at regional CSU campuses, consultations with community organizations and providers) suggested that, in the coming years, there will be particular need for research and researchers focusing on preventing chronic and infectious diseases. Thus, our proposed focus on Prevention Sciences can be accomplished within existing resource and is an important area of research that capitalizes upon our existing strengths.

That said, we do expect the program to be successful, and thus anticipate expanding the program in the future. Although any expansion will need to be done in consultation with the Graduate Council, Senate, Dean, and Provost, we would anticipate expanding in two ways. First, we will look to expand the specializations to include additional training in two areas: Environmental Health and Health Services Research & Policy. We will look to introduce the Environmental Health program in concert with our biomedical colleagues, and to introduce a program in Health Services Research and Policy with our colleagues in Economics and Management. The timing of this introduction will depend upon the pace at which faculty lines are allocated to Public Health and these other areas.

Second, we will consider offering or participating in the offering of a MPH degree. There are several options for implementing this degree, including offering a standalone MPH program (an

option that would require us to receive accreditation) or partnering with the accredited Public Health MPH program at California State University at Fresno to offer a joint MPH-Ph.D. program (such as exists between UCSD and SDSU). These options are not part of this current proposal, but we have included them as indication of the opportunities for expansion should conditions warrant.

1.3 Timetable and Projected Enrollment

We propose to initiate our graduate program in the Fall of 2016. We have sufficient staffing and resources to offer the program, and we have a track record of successfully teaching graduate students. Based on our assessment of likely student demand (detailed below in section 3.1), we anticipate having a sufficient number of quality applicants to admit 7 students each year. With an anticipated time until degree of between four and five years, and with six students already in the program through the Social Science Ph.D. program, then the number of students is expected to reach 26 by 2020 (as shown in Table 1).

Table 1. Four-year projection for the Ph.D. in Public Health at UC Merced.

Projected Number of Graduate Students and Faculty, 2016-2020				
	<u>2016-2017</u>	<u>2017-2018</u>	<u>2018-2019</u>	<u>2019-2020</u>
# of Students entering	7	7	7	7
Number enrolled each year	13	17	21	26
Expected attrition	1	1	1	1
Degree Earned: Each year	2	2	1	2
Faculty FTE:				
• Conservative estimate	8.5	8.5	8.5	8.5
• Moderate growth estimate	16.5	17.5	18.5	19.5
Grad Student/faculty ratio:				
• Conservative estimate	1.5	2.0	2.6	3.1
• Moderate growth estimate	0.8	1.0	1.2	1.3
Projected undergraduate majors	80	120	150	180

The -graduate student to faculty ratio will depend upon the number of faculty advisors to Public Health students. There are seventeen faculty associated with Public Health graduate degree, including 6.5 FTE core members (Brown, Ramirez, Cisneros, Gonzalez, Goldman-Mellor, Wooding, and Joyce ¹⁴), 1 FTE UC ANR (Diaz Rios) located full time at UC Merced and a core faculty member in Public Health, 1 FTE Prevention Sciences position (Nancy Burke, scheduled to join UC Merced in July 2015), and 8 FTE faculty whose primary affiliation is in an area other than Public Health. Under the conservative assumption that only those faculty with the primary association in Public Health become primary supervisors for Public Health students and that no additional new faculty (other than the Prevention Sciences candidate) are hired, then there will be 8.5 FTEs available to be primary supervisors in 2016/17. Under these assumptions, the graduate student to faculty ratio will range from 1:1.5 in 2016/17 to 1:3.1 in

¹⁴ Andrea Joyce if .5 FTE in Public Health, .5 FTE Research Scientist.

2019/20 (see Table 1). However, if we assume moderate growth of faculty of 1 per year and that the faculty associated with Graduate Group are available to be primary supervisors, then the number of faculty will rise from 16.5 to 19.5, and the graduate student to faculty ratio range from 1:1.8 to 1:1.3. Given that we are aiming for an eventual ratio of approximately 1:3.0, under this scenario there would be scope for expanding the number of graduate students should there be sufficient student demand.

1.4 Relation of Proposed Program to Other UC Merced Programs

The University of California, Merced currently offers graduate training in Biological Engineering and Small-Scale Technologies, Cognitive and Information Sciences, Environmental Systems, Applied Mathematics, Political Science, Psychological Sciences, Sociology and Quantitative and Systems Biology. New programs currently under review include Molecular and Cell Biology, Economics, and Management. While our graduate program is independent from other graduate programs at UC Merced, it builds upon the strengths on campus in two ways. First, as fitting the field of Public Health, our program is interdisciplinary and compliments several other graduate programs on campus. For instance, the Graduate Group includes eight members from three other proposed or existing graduate groups (Psychological Sciences, Molecular and Cell Biology, and Economics). As described in our proposed course of study, we propose to promote an interdisciplinary course of study and avoid redundant course offerings by requiring our students to take the graduate level statistics courses offered by Sociology and elective courses from other disciplines.

Second, as mentioned above, our proposal is part of a larger proposed strategic theme of Human Health Sciences research and education at UC Merced submitted as part of the SAF initiative. Human health is represented across a broad range of systems from cells to society, including genes, organ systems, behavior patterns, human relationships, and environmental context. Therefore the human health sciences include scientists from a multitude of disciplines who typically collaborate in multidisciplinary teams. The Human Health Sciences proposal consolidates human health sciences research and education at UC Merced from ten proposals classified as relevant to health, including four recognized as having human health as their central focus: Psychological Sciences/Healthy Development, Public Health, HSRI, and Molecular and Cell Biology. The proposal suggests a number of steps that can be taken to establish Human Health Sciences as a pillar of excellence at UC Merced by 2020, including appointing or hiring a campus-wide leader for the development of these initiatives (e.g., Vice Chancellor for Health Sciences), develop a formal structure that would allow the graduate groups and bylaw units with an interest in human health sciences to participate in decisions regarding the growth of human health sciences, continue to develop research infrastructures that will allow efficient use of resources, including a Translational Research Center that includes survey research capabilities and a mobile community research lab to provide access to patients and providers in the region, and expand the graduate education on campus in areas relevant to Human Health Sciences. The called expansion in graduate education included having MCB introduce an interdisciplinary PhD degree focused upon: (1) Infectious Disease and Immunity; (2) Brain and Behavior, and (3) Stem Cell Biology and Regenerative Medicine, having Psychology expand PhD training focused on healthy development through synergies among Developmental, Health, and

Quantitative, and Public Health introducing an MSPH and PhD program focused on Prevention Sciences. The current proposal is thus consistent with the vision described in the Human Health Sciences SAF submission. At the current time, the SAF initiative has identified Human Health Sciences as being one of the chosen pillars of excellence at UC Merced.

1.5 Relation of Proposed Program to Other UC Programs

At present, there are two Schools of Public Health (Berkeley and Los Angeles) within the UC system, one joint Public Health program (UC San Diego and San Diego State University), and stand-alone Ph.D. programs at UC Irvine and UC Davis. A number of campuses within the California State University system offer the terminal Master of Public Health (MPH) degree (Fresno, Northridge, Long Beach State, Fullerton, San Francisco, and San Jose). There is no Ph.D. program in Public Health in the San Joaquin Valley.

The School of Public Health at UC-Berkeley offers Ph.D. degrees in Biostatistics, Environmental Health Sciences, Epidemiology, Health Services and Policy Analysis, and Infectious Diseases. The UCLA School of Public Health offers Ph.D. degrees in Biostatistics, Community Health Sciences, Environmental Health Sciences, Epidemiology, and Health Services. The Public Health program of UC-San Diego offers Ph.D. in Public Health with possible concentrations in global health, health behavior, and epidemiology. UCSF is in the process of introducing a Ph.D. in Global Health Sciences. UC Davis offers Ph.D. degrees in Epidemiology, Biostatistics, and Pharmacology & Toxicology, each administered by a different graduate group composed of members of various academic units. In addition, UC Davis has recently proposed a Ph.D. in Public Health Sciences. UC Irvine offers a Ph.D. in Global Health and Disease Prevention.

Our program shares characteristics with the programs at the other UC campuses. All campuses offer the type of academic Ph.D. that we are proposing. All programs offer training in Prevention Sciences (or equivalent), provide training in community based participatory research (CBPR), and promote dissemination and implementation of the results (translational research). UC Irvine's program focuses on admitting and training a small number of students in interdisciplinary and participatory research, with an emphasis on hypothesis-driven research to identify successful strategies for reducing the burden of chronic and infectious diseases in vulnerable populations. As with the UCSD/SDSU joint program, we have many collaborations with CSU Fresno, and we will seek to establish close ties with other CSU campuses. Our program shares some similarities to the proposed program from UC Davis in Public Health Sciences, with both programs emphasizing the importance of dissemination and implementation research, and looking to provide culturally relevant training to Ph.D. students.

The fact that our program is similar in some respects to the programs offered at other UC campuses is a sign that we are proposing a concentration (Prevention Sciences) that other campuses see as appropriate for Ph.D. programs in Public Health. What distinguishes our program is that we will utilize the strengths of our campus (opportunities for transdisciplinary research, diverse faculty with experience working with

rural, vulnerable groups), existing expertise and resources on campus regarding translational and participatory research (HSRI, Blum Center, and ReCESS), and a natural laboratory in which to conduct research (SJV) to offer students more targeted and focused training in conducting research with rural, ethnically diverse, underserved communities than is available elsewhere in the UC system. As described below in our course of study, our proposed program emphasizes translational research and community based participatory research, including training students to work with diverse populations in underserved communities, to address relevant public health challenges. Moreover, students will be actively encouraged to work in transdisciplinary research teams composed of our diverse faculty and other stakeholders in order to maximize the translational potential of their research projects. While these opportunities are present at other UC campuses, they are the center piece of our program and thus will attract students who are looking for this type of experience and training.

Given our proposed emphasis, we expect to attract students who either live and work in the region, are completing degrees (either undergraduate or MPH) at a local CSU campus, or have a particular interest in conducting research relevant to rural, underserved, ethnically diverse communities. While other campuses offer training relevant to these types of students, based on the initial interest in our graduate program (i.e., current graduate students and the recent applicants), we expect that many of the students we attract would not have chosen to pursue a Ph.D. at one of the other campuses. Thus, we expect our program to compliment rather than compete with programs offered at other UC campuses. Our ability to bring students into the program who may not have pursued a Ph.D. elsewhere will also contribute to the diversification of the public health workforce by producing Ph.D. graduates who come from the very communities suffering the worst health disparities. We see this as an important strength of the proposed program and an important contribution to improving health outcomes in the region and elsewhere.

While the students associated with our proposed Ph.D. program will be encouraged to engage in research on health issues facing rural, vulnerable, ethnically diverse populations, achieving widespread change will require engaging students and researchers with areas of expertise not emphasized in our program. Our faculty and students will look to actively collaborate with faculty and students from other UC campuses interested in conducting research that addresses the health issues of the rural, vulnerable, ethnically diverse populations such that exist in the SJV. While researchers from other UC campuses have had notable successes in conducting important Public Health research in the region, the formation of a Public Health Graduate program at UC Merced will provide additional opportunities for researchers and students at other campuses to engage in collaborative research endeavors in the region.

1.6 Program Administration

The UCM Graduate Council oversees all graduate programs on campus. It will be asked to review this proposal and provide a letter of support. The Public Health Graduate Group Bylaws (see Appendix B) establish program oversight and resource allocation by an academic Dean. The Dean of the School of Social Sciences, Humanities, and Arts (Mark Aldenderfer) will serve this role. The admissions process and academic oversight is provided by UCM Graduate Division (headed by the Dean of

Graduate Studies, Marjorie Zatz), with administrative assistance provided by her staff.

Mitch Ylarregui is the Graduate Group Coordinator and Regan Pope is the Assistant Coordinator for the School of Social Sciences, Humanities and Arts. These staff members will help the Public Health graduate program with graduate student record keeping, as well as with paperwork related to Research and Teaching Assistants, fellowships, and recruitment.

Issues pertaining to Public Health Graduate Group membership and day-to-day program administration are described in the bylaws (Appendix B). Elections for Graduate Group Chair and Graduate Studies Committee members will occur once the proposed program is approved; and other committees will be formed subsequently following the bylaws. The Public Health Graduate Group faculty will meet at least twice per year, and more frequently on an as-needed basis. The Graduate Studies Committee will meet in January to evaluate applications to our graduate program and in May and December, and more frequently if needed, to formally evaluate graduate student progress in the program.

1.7 Program Assessment Plan and Learning Outcomes

Upon completion of the Public Health Ph.D., graduate students will be able to demonstrate a mastery of each of these Program Learning Outcomes (PLOs):

1. **Breadth** - Demonstrate knowledge of the discipline of Public Health
 - Students will be able to demonstrate a comprehensive understanding of Public Health, including phenomena at the biological, psychological, and social levels.
2. **Depth** - Expertise in a specific scientific domain
 - Students will be able to apply their expertise in a specific subfield of Public Health and identify novel research questions within the context of current research.
3. **Methods** - Competency with mixed methods approaches to conducting rigorous research on public health phenomena.
 - Students will be able to design a study drawing upon mixed method approaches and complete a study using a methodology appropriate to their research area.
4. **Communication** - Effective scientific communication skills, especially the ability to convey complex concepts and information in a clear and concise manner.
 - Students will be able to communicate their knowledge of contemporary social science methods to diverse audiences.
5. **Transdisciplinary research** - Understanding of transdisciplinary approaches to addressing public health challenges
 - Students will be able to demonstrate an understanding of using transdisciplinary approaches to address a pertinent public health challenge
6. **Translational research** - Competency in translational research
 - Students will have an understanding of the principles of translational research methods and demonstrate an ability to integrate translational research methods into their independent research as appropriate

7. **Independent research** - The ability to initiate and conduct independent research that makes an original contribution to Public Health knowledge.
 - Students will produce research of a quality that can be published in a peer-reviewed outlet.
8. **Professionalism** - Proficiency in the skills needed to participate in the intellectual and organizational aspects of the profession of Public Health.
 - Students will become active members of the professional public health community, including attending and participating in conferences and other appropriate venues.

The Public Health Graduate Curriculum Committee will oversee the collection and analysis of program assessment data, including a Program review every 7 years and a yearly self-assessment process. UC Merced policy regarding the periodic review of graduate programs is described in the document entitled Graduate Academic Program Review Policy and Procedures (May 2013).¹⁵ The Public Health Graduate program review will follow those procedures and timeline, with data for WASC assessment being collected each year to assess our progress with achieving the PLOs. The PLOs were designed with the goal of placing our Ph.D.s in post-doctoral and tenure-track positions in competitive research universities and public health research positions in government and non-governmental organizations.

Assessment data will be gathered for each of the six different PLOs. Once the graduate group is approved, these PLOs will be maintained for review and feedback on the Public Health website, in the UC Merced catalog, and also will be disseminated annually to incoming students at the Fall Orientation session. To enable these PLOs, our training program emphasizes both breadth and depth in Public Health. Table 2 provides a summary of the data to be used to assess progress towards and achievement of the PLOs. We plan to analyze data from three points during a student's graduate career in order to determine at what point problems may be occurring. Benchmark goals for program progress are displayed; however, as evidence becomes available in larger sample sizes and baselines of student performance emerge, we may adjust these benchmark goals.

The Graduate Curriculum Committee is responsible for implementing the program's assessment plan. The findings will be discussed by all Graduate Group faculty members. Depending on the results of assessment, the Graduate Group will modify and refine the structure and content of graduate training to ensure achievement of the Program Learning Outcomes. All data will be collected via scored rubrics, group interview reports, teaching evaluation summaries, and annual progress reviews gathered between review periods. Due to the limited amount and types of data that will be available in the early years of the program, we expect the lines of evidence used for assessment to change slightly over time. Specifically, with regard to PLOs 1 and 4 we will use Qualifying Examination data and First Year Examination data as early assessment tools. We will transition to using Dissertation Proposal and Dissertation Data once these

¹⁵ http://senate.ucmerced.edu/sites/senate.ucmerced.edu/files/public/Graduate%20Program%20Review_Policy_Approved_5.09.14.pdf.

Table 2. Lines of Evidence for Assessing Public Health Ph.D. Program Learning Outcomes

Program Learning Outcome	Lines of Evidence		Program Goals Timeline	Performance Targets / Expectations (for Direct Evidence)
	Direct	Indirect		
1. Breadth Knowledge in Public Health	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview. c. Teaching assistantship 	Data analyzed in 2016-17	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral Dissertation e. Average "overall effectiveness of teaching" evaluations of 5 or higher
2. Depth Knowledge in a specific Public Health area	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview c. Teaching assistantship 	Data analyzed in 2017-18	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral Dissertation e. Average "overall effectiveness of teaching" evaluations of 5 or higher
3. Methods	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview 	Data analyzed in 2018-19	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral

4. Communication	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview c. TA evaluations 	Data analyzed in 2015-16	Dissertation <ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral Dissertation e. Average "overall effectiveness of teaching" evaluations of 5 or higher
5. Transdisciplinary research	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview 	Data analyzed in 2016-17	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral Dissertation
6. Translational research	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview 	Data analyzed in 2015-16	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal & Defense d. 100% of students Doctoral Dissertation
7. Independent Research	<ul style="list-style-type: none"> a. Second year thesis b. Qualifying Exam c. Doctoral Dissertation Proposal d. Doctoral Dissertation 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview 	Data analyzed in 2019-20	<ul style="list-style-type: none"> a. 90% of students pass the Second Year thesis b. 85% of students pass the Qualifying Exam c. 100% of students pass the Doctoral Dissertation Proposal &

8. Professionalism	<ul style="list-style-type: none"> a. Teaching assistantships b. Presentations at Public Health conferences 	<ul style="list-style-type: none"> a. Annual progress review b. Group interview c. TA evaluations 	Data analyzed in 2018-19	<ul style="list-style-type: none"> Defense d. 100% of students Doctoral Dissertation b. Average "overall effectiveness of teaching" evaluations of 5 or higher b. Presentation of poster and/or paper at minimum 1 conference per year
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Table 3. Ph.D. Curricular Map

Course number and title	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
Required Courses								
• PH 201: Foundations of Public Health	I/D/M	I	I	I	I/D/M	I/D	I	I
• PH 202: Epidemiology	I/D/M	M	M				D/M	
• PH 203: Research methods in Public Health	I/D/M		D/M		D/M	D/M	D	
• Soc 210: Statistics 1: Linear Regression Analysis*			D/M				D/M	
• Soc 211: Statistics 2: Categorical Regression*			D/M				D/M	
• PH 208a: Professional seminar	I/D/M			D/M	I	I		I/D/M
• PH 208b: Professional seminar	I/D/M			D/M	I/D/M	I/D/M		I/D/M
Discipline Req. (1 course)								
• PH 204: Environmental Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 205: Health Services Research & Policy		D/M	D	D/M	D/M	D/M	D/M	D
• PH 206: Health Communication		D/M	D	D/M	D/M	D/M	D/M	D
• PH 207: Social and Behavioral Theory in Public Health		D/M	D	D/M	D/M	D/M	D/M	D
Advanced Methods Req. (1 course)								
• PH 223 Qualitative Research Methods for Public Health			D/M	D/M	D/M	D/M	D/M	D/M
• PH 224 Environmental Epidemiology			D/M	D/M			D/M	D/M

	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
• PH 225 Advanced Quantitative Methods			D/M	D/M			D/M	D/M
Elective courses								
• PH 204: Environmental Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 205: Health Services Research & Policy		D/M	D	D/M	D/M	D/M	D/M	D
• PH 206: Health Communication		D/M	D	D/M	D/M	D/M	D/M	D
• PH 207: Social and Behavioral Theory in Public Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 221: Social Epidemiology & Health Disparities		D/M	D		D/M	D/M	D/M	
• PH 222: Program Design & Evaluation			D/M	D/M	D/M	D/M	D/M	D/M
• PH 223 Qualitative Research Methods for Public Health			D/M	D/M	D/M	D/M	D/M	D/M
• PH 224 Environmental Epidemiology			D/M	D/M			D/M	D/M
• PH 225 Advanced Quantitative Methods			D/M	D/M			D/M	D/M
• PH 235 Pesticides, Health, and the Environment		D/M	D	D/M			D/M	
• PH 236 Vector Ecology for Public Health		D/M	D	D/M			D/M	
• PH 241 Public Health Genetics		D/M	D	D/M			D/M	

	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
• ES 234: Air Pollution and Resources		D/M	D/M					
• PSY 202C: Multivariate Analysis			D/M	D/M			D/M	
• PSY 208A: Methods for Program Evaluation			D/M	D/M			D/M	
• PSY 208B: Theory of Program Evaluation			D/M	D/M			D/M	
• PSY 206: Quantitative Methods for Reviewing Research			D/M	D/M			D/M	
• PSY 220: Health Psychology		D/M	D/M	D/M		D/M		
• PSY 230: Developmental Psychology		D/M	D/M	D/M		D/M		
• PSY 224: Health Disparities		D/M	D/M	D/M	D/M	D/M		
• PSY 225: Health Risk Decision Making		D/M	D/M	D/M		D/M		
• PSY 280: Human Behavioral Genetics		D/M	D/M	D/M		D/M		
• Soc 230. Stratification		D/M	D/M	D/M				
• Soc 245. Sociology of Health		D/M	D/M	D/M	D/M			
Second year thesis	D/M	D/M	D/M	D/M	D/M	D/M	D/M	I/D
Qualifying exam	D/M	D/M	D/M	D/M	D/M	D/M	D/M	
Teaching assistantship	D/M	D/M		D/M				D/M
Doctoral dissertation proposal & defense	D/M	D/M	D/M	D/M	D/M	D/M	D/M	D/M
Doctoral dissertation research	D/M	D/M	D/M	D/M	D/M	D/M	D/M	D/M

Table 4. MSPH Curricular Map

Course number and title	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
Required Courses								
• PH 201: Foundations of Public Health	I/D/M	I	I	I	I/D/M	I/D	I	I
• PH 202: Epidemiology	I/D/M	M	M				D/M	
• PH 203: Research methods in Public Health	I/D/M		D/M		D/M	D/M	D	
• Soc 210: Statistics 1: Linear Regression Analysis*			D/M				D/M	
• Soc 211: Statistics 2: Categorical Regression*			D/M				D/M	
• PH 208a: Professional seminar	I/D/M			D/M	I	I		I/D/M
• PH 208b: Professional seminar	I/D/M			D/M	I/D/M	I/D/M		I/D/M
Discipline Req. (1 course)								
• PH 204: Environmental Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 205: Health Services Research & Policy		D/M	D	D/M	D/M	D/M	D/M	D
• PH 206: Health Communication		D/M	D	D/M	D/M	D/M	D/M	D
• PH 207: Social and Behavioral Theory in Public Health		D/M	D	D/M	D/M	D/M	D/M	D
Advanced Methods Req. (1 course)								
• PH 223 Qualitative Research Methods for Public Health			D/M	D/M	D/M	D/M	D/M	D/M
• PH 224 Environmental Epidemiology			D/M	D/M			D/M	D/M

	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
• PH 225 Advanced Quantitative Methods			D/M	D/M			D/M	D/M
Elective courses								
• PH 204: Environmental Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 205: Health Services Research & Policy		D/M	D	D/M	D/M	D/M	D/M	D
• PH 206: Health Communication		D/M	D	D/M	D/M	D/M	D/M	D
• PH 207: Social and Behavioral Theory in Public Health		D/M	D	D/M	D/M	D/M	D/M	D
• PH 221: Social Epidemiology & Health Disparities		D/M	D		D/M	D/M	D/M	
• PH 222: Program Design & Evaluation			D/M	D/M	D/M	D/M	D/M	D/M
• PH 223 Qualitative Research Methods for Public Health			D/M	D/M	D/M	D/M	D/M	D/M
• PH 224 Environmental Epidemiology			D/M	D/M			D/M	D/M
• PH 225 Advanced Quantitative Methods			D/M	D/M			D/M	D/M
• PH 235 Pesticides, Health, and the Environment		D/M	D	D/M			D/M	
• PH 236 Vector Ecology for Public Health		D/M	D	D/M			D/M	
• PH 241 Public Health Genetics		D/M	D	D/M			D/M	

	<i>Breadth</i>	<i>Depth</i>	<i>Methods</i>	<i>Communication</i>	<i>Transdisciplinary research</i>	<i>Translational Research</i>	<i>Independent Research</i>	<i>Professionalism</i>
• ES 234: Air Pollution and Resources		D/M	D/M					
• PSY 202C: Multivariate Analysis			D/M	D/M			D/M	
• PSY 208A: Methods for Program Evaluation			D/M	D/M			D/M	
• PSY 208B: Theory of Program Evaluation			D/M	D/M			D/M	
• PSY 206: Quantitative Methods for Reviewing Research			D/M	D/M			D/M	
• PSY 220: Health Psychology		D/M	D/M	D/M		D/M		
• PSY 230: Developmental Psychology		D/M	D/M	D/M		D/M		
• PSY 224: Health Disparities		D/M	D/M	D/M	D/M	D/M		
• PSY 225: Health Risk Decision Making		D/M	D/M	D/M		D/M		
• PSY 280: Human Behavioral Genetics		D/M	D/M	D/M		D/M		
• Soc 230. Stratification		D/M	D/M	D/M				
• Soc 245. Sociology of Health		D/M	D/M	D/M	D/M			
Second year thesis	D/M	D/M	D/M	D/M	D/M	D/M	D/M	I/D

become available. Additionally, as the program graduates students, we plan to add data from the Graduating Student Survey and the Graduate Alumni Survey for assessing all six PLOs.

The following Curricular Maps (Tables 3 and 4) connect PLOs to required coursework and additional requirements of the program. In these maps, the level of understanding and skill acquisition is indicated as: I=Introductory, D=Developing, and M=Mastery. Where a range is given higher levels of achievement are expected from more advanced students.

Section 2: Program

Training provided by our faculty will produce high quality public health scientists who a) value interdisciplinary research; b) understand public health phenomena at biological, psychological, and social levels; c) are able to conduct research using laboratory experimentation, field research techniques, secondary data analyses, and/or theoretical analysis; and d) are proficient with public health issues and applications, particularly as they pertain to the prevention of chronic and infectious disease in vulnerable populations. Expertise is developed through a systematic study of public health theory, current methodologies and substantive courses designed to facilitate the advancement of our science. Students will acquire the requisite depth of understanding and the practical skills required to advance the frontier in Public Health. Student mastery is assessed through course performance, a research thesis to be completed by the end of their second year, a qualifying exam, a doctoral dissertation proposal, and ultimately by the dissertation research and defense.

The proposed program leads to the degree of Doctor of Philosophy in Public Health. Ph.D. students will have the option to obtain a Master of Science in Public Health (MSPH) degree, either en route to a Ph.D. (non-terminal) or in lieu of a Ph.D. degree (terminal) if a student exits the graduate program prior to fulfilling the Ph.D. requirements. A stand-alone Master's Degree program is not proposed at this time. The program emphasizes in-depth research involvement and close mentoring by faculty.

2.1 Undergraduate Preparation for Admission

All students seeking admission to the Public Health Graduate program must make a formal application for admission. Applicants will use an online application to streamline the process. Applications are reviewed by the Graduate Studies Committee, upon consultation with the Graduate Faculty, which makes recommendations on admission to the Graduate Group Chair (see Appendix B). The Dean of Graduate Studies makes final decisions on admission. The deadline for receipt of applications is January 15 for enrollment in Fall semester. Enrollment in other semesters will not be typical, but may be considered on an individual basis. Materials to be submitted include:

- Official application form
- Application fee
- Official transcripts from all prior university or college attendance
- An official Graduate Record Exam (GRE) score report (only the general tests are required)

- A statement of research interests and career goals
- Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and promise as a researcher (letters from faculty are preferred)
- Official score reports from the Test of English as a Foreign Language (TOEFL), if the applicant's native language or language of instruction is other than English. The Test of Spoken English (TSE) is recommended (not required) for admission, but is required for such applicants who wish to be considered for teaching assistantship (TA) positions.

The minimum requirement for graduate admission to UCM is a bachelor's degree with grade point average of 3.2 or greater on a 4.0 scale. Performance on the GRE, distribution of undergraduate grades, accomplishments in undergraduate research, and letters of recommendation will also be evaluated as important determinants of an applicant's potential for success in graduate education. Students with undergraduate degrees in Public Health normally have a background that is well suited to the graduate study in Public Health; however, applicants with other degrees (e.g., nursing, medicine, psychology, economics, sociology, and human biology) are strongly encouraged to apply. When deciding on whether to admit a student, the Admissions Committee will weigh performance on the GRE, undergraduate institution and grades, undergraduate research, willingness of faculty to serve as Faculty Advisors, and letters of recommendation, but will not apply a strict numeric formula to determine entry.

2.2 Foreign Language

Ability in a foreign language is not required for the Public Health program, although fluency in another language (such as Spanish or Hmong) will be encouraged.

2.3 Program of Study

In general, students seeking a Ph.D. degree in Public Health must satisfy all of the requirements for a Ph.D. degree specified by the Graduate Division of the University of California, Merced. These include residency requirements and scholarship requirements, including a minimum grade-point average (GPA). These requirements are described in detail in the *Graduate Advisors Handbook*, available from the Graduate Division. In addition to these general requirements, students must satisfy a range of program-specific requirements in order to be awarded a Ph.D. in Public Health. Students must complete a program of coursework, a research thesis by the end of their second year, a qualifying exam, a doctoral dissertation proposal and defense, and a dissertation research and defense that contributes to knowledge in the field. It is also expected that graduate students will contribute to and generate additional research and add to the intellectual and organizational life of the department through service work, teaching, and exchange with graduate student colleagues.

2.3.1 Organization of student supervision

The organization of the student's supervision will be as follows: It is expected that the student will communicate with at least one member of the Graduate Group prior to the Admissions Committee deciding to offer admissions to the program. Prior to the admissions decisions, the Graduate Group chair

will ensure that all prospective students indicate one or more Graduate Group faculty members to serve as their Faculty Advisor during the first two years. Prior to the meeting of the Admissions Committee, the Graduate Group Chair must confirm that one or more Graduate Group faculty is willing to serve as the student's Faculty Advisor. The Graduate Group Chair will then assign each student a Faculty Advisor and inform the student. If no faculty member is willing to serve as the Faculty Advisor for the student, then it is expected that the student will not be offered admission. Students must meet all other requirements before being admitted to the program.

Once assigned to be a student's Faculty Advisor, the Faculty Advisor is expected to:

- Offer guidance in course selection,
- Assist the student in developing a research project that will serve as the basis of the Second Year Thesis,
- Augment the student's depth of knowledge in a specific discipline within Public Health through the student's involvement in the research process and other readings/training as deemed necessary with the student's Faculty Advisory Committee,
- Chair the student's Faculty Advisory Committee,
- Formally evaluates the student's progress in the program on an annual basis (see Section 2.8.1); and
- Provide other mentorship and guidance necessary regarding teaching, research, and professional conduct.

A graduate student must have a recognized Faculty Advisor at all times. The initial Faculty Advisor is expected to serve as the student's faculty advisor until the beginning of the third year. At the beginning of the third year, in consultation with the faculty and the student, the Graduate Group Chair will assign each student a Faculty Advisor. The Faculty Advisor must be a member of Public Health Graduate Group of the UC Merced School of Social Sciences, Humanities and Arts.

A student's Faculty Advisor may be changed provided that a valid reason is provided and approved by the Graduate Group Chair. When a student decides a change in Faculty Advisor is in his/her best interest, he/she must obtain a clear commitment by the new Faculty Advisor to take on this responsibility. The student needs to inform the former Faculty Advisor and the Graduate Group Chair of this change. Examples of valid reasons include personality conflict, changes in research, and the resignation of the Faculty Advisor from the Graduate Group. If a student requests to change Faculty Advisors, the Chair of the Graduate Group will seek to ensure a smooth transition that takes into account the needs of both the student and the faculty involved.

The student is to form a Faculty Advisory Committee by the end of the first year that includes the Faculty Advisor and two other members of the Public Health Graduate Group. The Faculty Advisory Committee will guide the student through the first two years of the program, including the completion of the Second Year Thesis. At the beginning of the third year, the student will form a Candidacy Committee to help guide

the student through the completion of the Qualifying Examination. Membership in the Candidacy Committee may or may not be the same as the Faculty Advisory Committee that assisted the student through the first two years. Upon the successful completion of the Qualifying Exam, it is expected that the Candidacy Committee (CC) will become the student's Faculty Advisory Committee for the Dissertation preparation phase. Upon successfully defending the Dissertation Proposal, it is expected that the Faculty Advisory Committee will become the student's Dissertation Committee (DC). The student may change membership of these committees at any time after consultation with the Faculty Advisor and with approval of the Graduate Group Chair.

2.3.2 *Specific field of emphasis: Prevention Sciences*

We will initially offer a single area of specialization: Prevention Sciences. A number of our faculty (Brown, Cameron, Gilger, Goldman-Mellor, Gonzalez, Ramirez, Schnier, Song, Wallander, Diaz-Rios, and Weibe) have an expertise and proven track record of grant funding and publications in Prevention Sciences, with the other faculty having an expertise in the biological and environmental aspect of public health that are pertinent to Prevention Sciences (Barlow, Cisneros, Joyce, Ojcius, and Wooding). In addition, a number of faculty have an expertise in transdisciplinary research addressing health disparities among vulnerable populations through community-based participatory research (Song, Ramirez, Gonzalez, Dias-Rios) and in translating research to policy makers and healthcare providers (Brown, Cameron, Wallander, Weibe, Ramirez, Diaz-Rios and Gonzalez). These researchers and the existing research entities on campus (i.e., HSRI, Blum Center, and ReCESS) will facilitate the process by which students develop CBPR projects with the diverse ethnic minority populations in the SJV, including Hmong, Laotian, Punjabi, Native American, and Indigenous Mexican communities (such as the Oaxacan community).

Our program will emphasize the use of mixed methods and transdisciplinary approaches to addressing the prevention of chronic or infectious disease in rural, underserved, and ethnically diverse communities. Mixed methods research has been defined as a research approach or methodology that: ¹⁶

- focuses on research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences;
- employs rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs;
- utilizes multiple methods (e.g., intervention trials and in-depth interviews);
- integrates or combines these methods to draw on the strengths of each; and
- frames the investigation within a philosophical and theoretical position

Transdisciplinary research (or 'team science') is a collaborative approach to conducting research that

¹⁶Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133.

involves having researchers from different fields of expertise to address public health challenges. As opposed to single-investigator driven approaches, transdisciplinary research seeks to coordinate teams of investigators with diverse skills and knowledge to study complex social problems with multiple causes. This teamwork becomes interdisciplinary when there is a link, blend, and synthesis between separate approaches, and becomes transdisciplinary when (1) there are new conceptual and methodological frameworks and (2) stakeholders from multiple sectors of society participate in solving "real-world" problems.¹⁷

Transdisciplinary research is valid for all research endeavors, and all students will benefit from understanding the principles of team and translational science using mixed methods approaches, and how they are applied to address public health challenges. However, we recognize that it might be difficult to apply transdisciplinary approaches to some research questions. The extent to which these approaches are ultimately integrated into the student's dissertation research will be determined by the student, the Faculty Advisor, and the Faculty Advisory Committee.

We will provide training in transdisciplinary research and mixed methods as it applies to the prevention of chronic and infectious diseases through three aspects of their course of study. First, all students will be required to take a series of courses aimed at providing the breadth of the knowledge of the field of Public Health and Prevention Sciences (PH 201 Foundations of Public Health and PH 208a and PH 208b Professionalization Seminar). These courses will focus on providing an overview of the core disciplines within Public Health, the underlying determinants of infectious and chronic diseases (particularly among vulnerable populations in rural, underserved areas), and successful approaches for working with these diverse communities, including approaches that involve healthcare providers and governmental organizations. We will achieve this in part through the presentation of material (PH 201) and in part through exposure to researchers from a variety of disciplines and approaches (PH 208a and 208b). By focusing on the contexts in which public health challenges arise, our curriculum will challenge students in various ways to engage with both the complexity of the social and cultural determinants of health, as well as the potential of multilevel approaches to prevention and treatment.

Second, we will train students in mixed methods and translational approaches to addressing health disparities and evaluating the effectiveness of existing approaches to prevent infectious and chronic diseases. Mixed methods approaches are increasingly recognized as crucial to the study of health disparities. The students will be exposed to the range of mixed methods used in Public Health and their use in addressing chronic and infectious disease, including epidemiology (PH 202), quantitative analysis (SOC 210 and SOC 211) and qualitative analysis and the theory underlying mixed methods approaches (PH 202 Research Methods).

¹⁷ Julie Thompson Klein, Ph.D. Interdisciplinary Research and Team Science. Accessed on November 30, 2014 from <https://www.teamsciencetoolkit.cancer.gov/Public/ExpertBlog.aspx?tid=4>

Third, the course of study will emphasize the science of implementation and dissemination of research, emphasizing how to link theory to lifestyle changes, improvements in practice, and responsive public policies. These principles will be infused throughout their course of study, but will initially be emphasized in the Professionalization Seminar and Research Methods. Faculty will draw upon contemporary policy issues to model various approaches to translation and dissemination. Case studies will be developed from their own research experiences, as well as from the current public health literature, which will expose students to successful and unsuccessful dissemination strategies and challenge them to elaborate alternative approaches. Such a problem-based approach will provide students with the tools necessary to successfully negotiate research translation and dissemination in a variety of institutional and policy contexts. Furthermore, students will be required to incorporate principles of translational research into their 2nd Year Thesis and their dissertation research.

While mixed methods approaches are appropriate for addressing many Public Health problems, students are expected to gain a mastery of at least one type of analysis and to demonstrate this mastery in their dissertation research. To ensure that they have adequate preparation in a specific methodology, students will be required to take an advance methods course in a specific area. Given the type of research that students are likely to be engaged with during their dissertation, students will be required to take one of the following courses to fulfill their Advanced Methods requirement:

- PH 223: Qualitative Research Methods for Public Health (4 units)
- PH 224: Environmental Epidemiology (4 units)
- PH 225: Advanced Quantitative Methods (4 units)

Students will be encouraged to take other methods classes as electives, but at a minimum this will ensure they have the skills they need to progress to the dissertation phase of their course of study.

The third aspect of the training we will provide students is the depth of knowledge in a particular area of Public Health. While the overall focus is on transdisciplinary approaches to the prevention of chronic and infectious diseases, students are expected to have a particular emphasis within this area. The area will be influenced to a large degree by the expertise of their Faculty Advisor and Faculty Advisory Committee.

Based on the existing expertise of faculty associated with the Graduate Group, it is expected that these areas will roughly coincide with one of 4 areas:

- PH 204: Environmental Health (4 units)
- PH 205: Health Services Research and Policy (4 units)
- PH 206: Health Communication (4 units)
- PH 207: Social and Behavioral Theory in Public Health (4 units)

These courses will provide students with the theoretic foundation to pursue research relevant to prevention sciences from a specific perspective. Environmental Health (PH 204) will provide students with an understanding of the interaction between people and the environment, including how to recognize, assess and control the impacts of the environment on people and how best to gauge the impacts of the

environment on chronic and infectious diseases. Health Services Research and Policy (PH 205) will provide theories of access to health services, the impact of the structure and financing of health services on the health system, and how to work with policy and other decision makers to ensure research is translated into action. Health Communication (PH 206) will provide students with the theoretic foundations underlying the communication and promotion of health behaviors, particularly protective behaviors for vulnerable populations. Finally, Social and Behavioral Theory in Public Health (PH 207) will review theories and approaches to designing health interventions, with particular attention paid to the design and implementation of effective interventions and programs aimed at preventing chronic and infectious disease.

Students will be guided in the choice of courses in consultation with their Faculty Advisor and Faculty Advisory Committee. The goal will be to help the students select courses that will be relevant to his or her primary research area, but will be diverse enough to provide a transdisciplinary perspective on the theoretic perspective that they are taking. Thus, while there are a large number of potentially relevant electives that the student might take to augment their studies, there are likely to be some that are particularly relevant. For instance, a student focusing on health communication would be expected to take Health Communications (PH 206) as the Discipline requirement and related courses as electives such as Health Psychology (PSY 221), Social and Behavioral Theory in Public Health (PH 207), and the Sociology of Health (SOC 230). A student interested in health disparities might take Social and Behavioral Theory in Public Health (PH 207) as the Discipline requirement, Qualitative Research Methods in Health (PH 223) or Advanced Quantitative Methods (PH 225) as the Advanced Methods, and elective courses such as Health Disparities (PSY 224), Stratification (SOC 230), and Social Epidemiology (PH 221). Students interested in evaluating the effectiveness of health services might take Health Services Research and Policy (PH 205) as the Discipline course, Advanced Quantitative Methods (PH 224) as the Advance Methods requirement, and electives that might include Program Evaluation and Design (PH 222), Methods for Program Evaluation (PSY 208a), and Theory of Program Evaluation (PSY 208b). Students interested in pursuing research examining the interaction between the environment and health might take Environmental Health (PH 204) as the Discipline course, Environmental Epidemiology (PH 223) as the Advanced Methods course, and electives that include Pesticides, Health, and the Environment (PH 235), Vector Ecology for Public Health (PH 236), and Public Health Genetics (PH 241).

Aside from course work, there are two milestones that will demonstrate the student's expertise in a specific area prior to the dissertation. The first is Second Year Research Paper, which consists of an empirical research project taken from the conceptualization stage, through design, data collection, analysis, and write-up the research paper. As this project is intended to be conducted with the Faculty Advisor and should be of publishable quality, it is expected that the student will need to master the theory upon which the project is based. The second milestone is the Qualifying Exam paper. Completion of the written paper should be in the student's field of specialization, prepare the student for the dissertation research, and be of *publishable quality*. As such, this paper is intended to demonstrate that the student has a mastery of the theory underlying his or her eventual dissertation research topic.

2.3.3 Plan (Master's Degree; Doctoral Degree: Plan A):

The Master's of Science degree is not granted by the University of California merely for the fulfillment of technical requirements, such as residency or completion of fundamental courses. The recipient of a MSPH degree is understood to possess a thorough understanding of a broad field of knowledge and to have given evidence of accomplishment in that field. The University of California, Merced will not admit students seeking a terminal MSPH in Public Health. Receipt of a Master's Degree is optional, and is not necessary for receipt of the Ph.D. As such, students will apply only to the Ph.D. program. Requirements for the optional MSPH are described in Section 2.9.

Likewise, the Doctor of Philosophy degree is not granted by the University of California merely for the fulfillment of technical requirements. Rather, the recipient of a Ph.D. degree is understood to possess thorough knowledge of a broad field of learning, have demonstrated evidence of distinguished accomplishment in that field and critical ability. The degree also signifies that the recipient has presented a doctoral dissertation containing an original contribution to the knowledge base in his or her chosen field of study. Ultimately, the quality of the dissertation and the qualifications of the candidate for the Ph.D. in Public Health are determined by a faculty committee convened to provide such an evaluation to the Dean of Graduate Studies.

2.3.4 Unit Requirements

The Public Health Graduate Group has established that students must complete seven courses aimed at providing students with the breadth of knowledge of Public Health theory and methods (24 units), one course designed to provide specific training in a discipline (Discipline requirement: 4 units), one course designed to provide advanced training in research method and analysis (Advanced methods requirement: 4 units), and 24 units of elective courses (total = 56 units of graduate coursework). All of these courses must be taken for a letter grade. In accordance with University of California policy, a minimum of four semesters in academic residence is required prior to awarding a Ph.D.

2.3.5 Courses

All graduate students in Public Health will be required to complete a common core sequence of classes including:

Required: Core Public Health courses- 7 courses (24 units)

- PH 201: Foundations of Public Health (4 units)
- PH 202: Epidemiology (4 units)
- SOC 210: Statistics 1: Regression Analysis (4 units)
- SOC 211: Statistics 2: Categorical Regression Analysis (4 units)
- PH 203: Research Methods (4 units)
- PH 208a: Professionalization seminar (2 units)
- PH 208b: Professionalization seminar (2 units)

Required: Discipline - 1 course (4 units)

- PH 204: Environmental Health (4 units)

- PH 205: Health Services Research and Policy (4 units)
- PH 206: Health Communication (4 units)
- PH207: Social and Behavioral Theory in Public Health (4 units)

Required: Advanced methods - 1 course (4 units)

- PH 223: Qualitative Research Methods for Public Health (4 units)
- PH 224: Environmental Epidemiology (4 units)
- PH 225: Advanced Quantitative Methods (4 units)

Electives: (24 units)

- PH 204: Environmental Health (4 units)*
- PH 205: Health Services Research and Policy (4 units)*
- PH 206: Health Communication (4 units)
- PH 207: Social and Behavioral Theory in Public Health (4 units)
- PH 221: Social Epidemiology (4 units)
- PH 222: Program Design and Evaluation (4 units) *
- PH 223: Qualitative Research Methods for Public Health (4 units)
- PH 224: Environmental Epidemiology (4 units)*
- PH 225: Advanced Quantitative Methods (4 units)*
- PH 235: Pesticides, Health, and the Environment (4 units)
- PH 236: Vector Ecology for Public Health (4 units)
- PH 241: Public Health Genetics (4 units)
- ES 234: Air Pollution and Resources (3 units)
- PSY 202C: Multivariate Analysis (4 units)
- PSY 208A: Methods for Program Evaluation (4 units)
- PSY 208B: Theory of Program Evaluation (4 units)
- PSY 206: Quantitative Methods for Reviewing Research (4 units)
- PSY 220: Health Psychology (4 units)
- PSY 221: Issues in Health Psychology (4 units)
- PSY 224: Health Disparities (4 units)
- PSY 225: Health Risk Decision Making (4 units)
- PSY 230: Developmental Psychology (4 units)
- PSY 280: Human Behavioral Genetics (4 units)
- Soc 230: Stratification (4 units)
- Soc 245: Sociology of Health (4 units)

** If taken to fulfill the discipline or advanced methods requirement, the course cannot fulfill the elective requirement. That is, no double counting of courses.*

This course of study will provide students with an understanding of the basic areas of Public Health and Prevention Sciences (e.g., Foundations of Public Health, Epidemiology, Research Methods, and Statistics I and II), advanced training in a core Public Health discipline (Social and Health Behavior in Public Health, Health Services Research and Policy, or Environmental Health), advanced training in a methodology relevant to prevention sciences (Qualitative Research Methods in Public Health,

Environmental Epidemiology, or Advanced Qualitative Methods), and elective courses in areas relevant to their research interests.

The Graduate Division requires that graduate students be enrolled in at least 12 units of upper division or graduate-level units per semester. Registration in PH 299 may be used to fill this requirement in any given semester, with permission from the Faculty Advisor.

2.3.6 Teaching Requirement

To ensure that students earn a range of relevant experiences, every student must serve as a teaching assistant (TA) or equivalent for no fewer than 2 semesters. A student who has advanced to candidacy may fulfill the teaching requirement by teaching one full course of their own design.

2.3.7 Licensing and Certification

No licensing or certifications are required for this program.

2.3.8 Additional Requirements

All students must maintain a GPA greater than 3.0. In the case a student does not meet this standard, he or she will be put in academic probation for the duration of one semester. Should the standard still not meet this standard, he or she may be dismissed from the graduate program at the discretion of the Graduate Group Chair for failure to make due progress in the program.

2.4 Second Year Research Thesis

Research skills in Public Health are best acquired through classroom instruction and participation in research. Thus, before advancing to candidacy, graduate students are expected to complete a Second Year Research Thesis, which consists of an empirical research project taken from the conceptualization stage, through design, data collection, analysis, and write-up. The student need not be the originator of the research idea, but must be an active participant in all steps. However, the write-up of the Second Year Research Thesis must be sole authored by the student; other authors may be added to a later published version of the paper, as appropriate, and the order of authorship on such a subsequent publication may change. The project should be completed by the end of their second year of study (typically the end of the Spring semester). However, it must be completed and submitted for review prior to commencement of the 3rd year of the program (i.e., by the end of the summer following the 2nd year of graduate study), and it must be completed before advancing to candidacy. Note that a Faculty Advisor may expect that a student is involved in other research than that leading to the completion of the Second Year Research Thesis. The Second Year Research Thesis will be conducted in close collaboration with the Faculty Advisor; students should ensure that the Advisor concurs with decisions made at all stages of the project. The Second Year Research Thesis will be a written paper in the format of an empirical journal article. The Second Year Research Thesis must be approved by the Faculty Advisor as well as a second reader from the Faculty Advisory Committee. Upon submission of the final paper, the readers have at least 14 but no

more than 28 days to evaluate the paper and make a recommendation as to whether the Second Year Research Thesis requirement has been satisfied.

In the event that the Second Year Research Thesis is judged inadequate by one or both readers, a written request for revisions will be provided to the student. Students will be expected to undertake the requested revisions and resubmit the paper to the two readers within 6 weeks. Failure of this second draft must be addressed in the student's next Biannual Review, which must then involve the student's entire Faculty Advisory Committee. In the event that the student and the Faculty Advisory Committee do not agree on the acceptability of the Second Year Research Thesis, the Chair of the Public Health Graduate Group will make the final decision.

2.5 Qualifying Examinations and Advancement to Candidacy

All graduate students are considered resident graduates, not candidates for a degree, unless admitted to candidacy by the Graduate Division after formal application and satisfactory completion of candidacy requirements. Candidacy requirements:

- Demonstrating a high level of scholarship in full-time study (12 units minimum per semester including research hours) at the Ph.D. level,
- A minimum grade point average of 3.0,
- Passing the Qualifying Exam, which demonstrates readiness to proceed to the dissertation phase
- Passing of the Qualifying Exam, to be administered by the Candidacy Committee no later than the start of the 4th year of graduate study. Failure to do so must be addressed in the student's next review (described in Section 2.5.2), which must then involve the student's entire Faculty Advisory Committee. Prior to convening a student's Candidacy Committee, the Faculty Advisor, the Public Health Graduate Group Chair, and the graduate student must sign the Statement on Conflict of Interest form that is included in the Graduate Division form *Candidacy for the Degree of Doctor of Philosophy—Plan A*.

2.5.1 The Candidacy Committee

The Candidacy Committee (CC) is charged with determining the readiness of the student to proceed with the Doctoral Dissertation. The CC must be composed of no less than three members of the UC Merced Public Health Graduate Group faculty. An additional outside member (e.g. of another UC Merced administrative unit or from another university) can serve as a CC member if approved by the other members of the committee and the Graduate Division. The CC conducts and evaluates the student's Candidacy Examination.

The student should initially propose a CC to her/his Faculty Advisor; if supported by the Advisor, the student should contact the desired members and invite them to join the CC. Students should be aware that faculty members may in some instances be unable or unwilling to serve on a CC. The members of each student's CC are approved by the Chair of the Public Health Graduate Group and the Graduate Dean prior

to the start of its examination. The membership of the student's CC is listed on the Graduate Division form *Candidacy for the Degree of Doctor of Philosophy—Plan A*.¹ At this point the CC becomes the student's new Faculty Advisory Committee.

2.5.2 The Qualifying Examination

The Qualifying Exam in Public Health consists of proposing, completing, and orally defending a substantial research paper. Completion of the written paper constitutes the written portion of the Qualifying Exam. This paper shall represent the student's field of specialization, prepare the student for the dissertation research, and be of *publishable quality*. As such the paper must be novel and advance knowledge in the field. It is expected to be longer than a typical course or seminar paper at 35 to 45 double-spaced pages in length, not counting references. Students are encouraged to connect this paper to their planned dissertation, such that it create the foundation for and serve in part as the background and rationale for the Dissertation Proposal (see Sect. 2.6.2).

As a written exam, the paper must be sole authored by the student when submitted to the CC. After completion of the Qualifying Exam, other authors may be added to a later published version of the paper, as appropriate. Before writing the paper, the student must prepare and obtain approval for a proposal of the paper of approximately 5-8 double-spaced pages (not including references). This typically follows a process of discussions with the Faculty Advisor to ensure appropriate direction. The proposal should present the objectives of the paper, the rationale for why the paper is novel and will advance knowledge, and an outline of the sections planned for the paper, including a list of the most relevant references. The proposal is disseminated to the members of the CC, who then meet with the student as a committee to discuss the proposal. The proposal must be approved by the CC before the student commences writing the paper. It may take several months to develop the proposal and it is expected that about three months of mostly full-time work will be required to complete the review paper once the proposal has been accepted by the CC.

The Graduate Division's *Application for Qualifying Examination* form must be submitted at least one month prior to the completion of the Qualifying Exam. There is also an oral portion of the exam. The CC has at least 14 but no more than 28 days to review the review paper, and then meets with the student for the oral portion of the examination, in accordance with university and graduate group requirements. The student should schedule a minimum 120-minute block of time for the meeting. During the oral exam, at the discretion of the CC, the student may first present a brief (10-15 minute) overview of the paper. The CC will then discuss the subject addressed in the review with the student. The student is expected to be able to answer questions on all aspects of the subject to the satisfaction of the CC. Following the completion of the oral exam, the CC makes a recommendation whether to pass the student on the Qualifying Exam. The CC recommendation is by unanimous vote, leading to one of the following recommendations:

Pass: Oral and written portions of the Qualifying Exam are passed and the student may Advance

to Candidacy.

Minor Revisions: The oral portion of the Qualifying Exam is passed and the written portion passed pending minor revisions, which must be approved by the Faculty Advisor and any CC member wishing to review such changes. The timeline for revisions will be determined by the CC at the time the decision is made.

Major Revisions: The oral or written portion of the Qualifying Exam is not passed. The student must revise the review paper in light of any CC feedback and resubmit the paper within 6 weeks to make and submit those revisions, and the CC will then have at least 14 but no more than 28 days to review the revisions. A second oral exam must then be held with the student, after which the CC makes a recommendation whether to pass the student on the Qualifying Exam. A failure to oral pass either the written or oral portion of this second exam must be addressed in the student's next Biannual Review Progress Report (see below), which must then involve the student's entire Faculty Advisory Committee. Any further examination must have the approval of the Graduate Dean.

2.5.3 Advancement to Candidacy

When the Qualifying Exam is passed, both the written and oral portions, the student is recommended for Advancement to Candidacy as reported to the Graduate Division on the *Candidacy for the Degree of Doctor of Philosophy—Plan A*. This form must be signed by all Candidacy Committee members. This form is also submitted if the student failed the examination. If the recommendation of the Candidacy Committee is favorable, the student must pay the Advancement to Candidacy Fee to the campus Cashier's Office, which will validate the *Candidacy Form*. The student must then submit the *Candidacy Form* to the Graduate Division. The date the student submits the signed and validated *Candidacy Form* will be the official date of Advancement to Candidacy. The student at this point may use the title Doctoral Candidate. The candidate and Graduate Group will be notified of formal advancement.

2.6 The Doctoral Dissertation

The Doctoral Dissertation is the culmination of the Ph.D. program, in which the Doctoral Candidate demonstrates the capability to conduct research independently that makes an original contribution to knowledge of a quality that can be published in a reputable scientific journal. The planning and completion of the Dissertation is supervised by the Doctoral Committee Chair, who usually is the Candidate's Faculty Advisor. The student's Doctoral Committee approves the Dissertation proposal and evaluates whether the Dissertation has been completed in accordance with high scientific standards. In overview, the dissertation process starts with the establishment of the Doctoral Committee (DC), which is done when recording Advancement to Candidacy. The Doctoral Candidate submits a dissertation proposal to the DC, and defends the proposal at an oral Proposal Defense meeting. This should usually be done within six months of Advancing to Candidacy. If the proposal is passed by the DC, the student undertakes and completes the proposed research. Having completed the research, the student must submit a final written Dissertation to the DC, and defend the Dissertation at an oral defense meeting, which constitutes the Final Examination for the Ph.D. At the conclusion of the oral defense, the DC votes on

whether to approve the Dissertation. These stages are presented in more detail below.

2.6.1 The Doctoral Committee

The DC is chaired by the Candidate's Faculty Advisor. Upon appointment the DC becomes the Candidate's Faculty Advisory Committee. The membership of the DC is proposed on the Graduate Division form *Candidacy for the Degree of Doctor of Philosophy—Plan A*. The DC may differ in membership from the original Faculty Advisory Committee and from the Candidacy Committee to accommodate changes in the Candidate's research interests and available faculty expertise. No special procedure need be followed to change membership other than filling out this form.

The DC must be composed of no less than three members of the Public Health Graduate Group. An additional outside member (e.g. of another UC Merced administrative unit or from another university) can serve as a DC member if approved by the other members of the committee, the Chair of the Graduate Group, and the Graduate Division. The Candidate should initially propose a DC to her/his Faculty Advisor; if supported by the advisor, the Candidate should contact the desired members and invite them to join the DC. Candidates should be aware that faculty members may in some instances be unable or unwilling to serve on a DC. Once the DC has been agreed upon, the Candidate must secure signatures of all members and submit *Candidacy for the Degree of Doctor of Philosophy—Plan A* to the Public Health Graduate Group and the Graduate Division. Changes to the composition of the DC after its initial formation must be approved by the Faculty Advisor, the Public Health Graduate Group faculty as a whole, and the Graduate Division.

2.6.2. The Dissertation Proposal

The Dissertation Proposal (DP) serves three primary functions. First, it reviews the relevant literature and in so doing defines the area of inquiry of the proposed Dissertation. The Qualifying Exam paper is intended to enable the preparation of this portion. Second, it provides a clear statement of actionable research aims, questions, and/or hypotheses that will be addressed in the Dissertation. Third, it outlines the methodological and analytic approach that will enable the proposed research to address these aims, questions, and/or hypotheses.

The DP should be approximately 20 double-spaced pages, not including references and appendices. The Candidate works with the Faculty Advisor until the latter deems the DP of sufficient quality to pass to the DC. DC members should make every effort to provide such feedback in a timely fashion, but should inform the student promptly if they will be unable to provide such informal feedback. When the finalized DP is submitted, the DC should have at least 7 but no more than 14 days in which to review the DP prior to the Proposal Defense Meeting.

2.6.3 Proposal Defense Meeting

The Candidate must consult with the DC to schedule the Proposal Defense Meeting, at which all members of the committee must be present in person (or via conference call under extenuating circumstances such

as a DC member being on sabbatical or at a distant site). The Candidate should schedule a minimum two-hour block of time for the meeting.

At the Proposal Defense Meeting, the Candidate will present an overview of the proposal research. The DC will then discuss the proposed research with the Candidate. At the conclusion of the Proposal Defense Meeting, the Candidate will be asked to leave and the DC will deliberate on whether to pass the proposal. The DC recommendation is by majority vote with no more than one dissenting vote, leading to one of the following recommendations:

Pass: The proposal is passed and the Candidate may commence with the proposed research.

Minor Revisions: The proposal is passed pending minor revisions, which upon completion must be approved by the Faculty Advisor and any DC member wishing to review such changes.

Major Revisions: The proposal is not passed because major substantive or methodological issues need to be addressed. The Candidate must revise the proposal in light of committee feedback and resubmit the proposal within three months. At that time, the Candidate must reschedule the Proposal Defense Meeting and complete it satisfactorily before undertaking any dissertation research. Failure to complete it satisfactorily at a second defense must be addressed in the student's next Biannual Review, which must then involve the student's entire Faculty Advisory Committee.

2.6.3 The Dissertation

The format of the Dissertation manuscript should be approved by all members of the DC during the Proposal Defense Meeting, subject to any requirements by the Public Health Graduate Group, the Graduate Division, and the University Archives. The Candidate prepares the Dissertation under the supervision of the Faculty Advisor, who requests revisions until she or he judges the work is ready to be reviewed by the DC members.

The Candidate then circulates the Dissertation among DC members, who should provide crucial comments, possibly leading to another revision before the final submission and scheduling of the Dissertation Defense; DC members should provide these comments in a timely fashion. The final Dissertation must be provided to the DC members at least 14 but no more than 28 days prior to the defense.

2.7 Final Examination

The defense of the Dissertation is a capstone event in the Candidate's graduate education. It consists of a 30-minute oral presentation of the Dissertation, followed by questions and answers. This portion of the meeting is open to the public. Announcement of the oral defense time and location will be made in appropriate forums such as an email list serve or a Public Health bulletin board.

At the conclusion of the public portion of the defense, the Candidate and the DC will excuse the public in

order to discuss the Dissertation with the Candidate in private. At the conclusion of committee questions, the Candidate is excused and the DC deliberates and votes on whether to pass the Dissertation. The completed Doctoral Dissertation must be approved by the DC, who then recommends, by submission of *Ph.D. Form II*, the conferral of the Ph.D., subject to final submission of the approved Dissertation for deposit in the University Archives (see *Graduate Advisor Handbook*, Sect. VII.H.8).

The DC recommendation is by majority vote with no more than one dissenting vote:

Pass: The Dissertation is passed and the Candidate is awarded the Ph.D.

Minor Revisions: The Dissertation is passed pending minor revisions, which upon completion must be approved by the Faculty Advisor and any DC member wishing to review such changes. Upon approval the Candidate is awarded the Ph.D.

Major Revisions: The Dissertation is not passed because major substantive or methodological issues need to be addressed. The Candidate must revise the Dissertation in light of DC feedback and resubmit the Dissertation within 6 weeks. At that time, the Candidate must reschedule the Proposal Defense Meeting and complete it satisfactorily to receive a recommendation of Pass.

2.8 Special Requirements

The Public Health Graduate Group has approved a number of special requirements for graduate students, including procedures for selection of a Graduate Advisor and procedures for regular evaluation of graduate students. These are as follows:

2.8.1 Biannual Review Process

Student progress will be evaluated on a biannual basis. To this end, each student and their Faculty Advisor will fill out a Progress Report at the end of the Fall and Spring Semesters (see Appendix E6). It is expected that the Faculty Advisor will consult with faculty teaching courses in the sequence prior to preparing the students biannual Progress Report. In the Spring semester of each year the Graduate Studies Committee will also review the student's Progress Report. Biannual Review continues until the student has completed an approved Doctoral Dissertation.

A meeting is convened between the student and his/her Faculty Advisor prior to the end of each semester, in which feedback is provided to the student both orally and in writing. The Spring meeting should also include the other members of the Faculty Advisory Committee. As part of each review, a determination must be made whether the student's progress on the whole is Satisfactory or Unsatisfactory. This determination is then clearly communicated in written form and signed by the Faculty Advisor. The student also signs the evaluation indicating understanding of the evaluation and is given one copy. In the Spring semester the Graduate Studies Committee must also sign off on the Faculty Advisor's assessment of the student's Progress Report. In the case that the Graduate Studies Committee feels changes need to be made to the student's Progress Report, these changes will be made in consultation with the Faculty Advisor. The original is retained in the Public Health Graduate Group files.

Satisfactory Progress: Satisfactory progress is determined on the basis of both the student's recent academic record and overall performance. Satisfactory Progress is more than simply avoiding displaying any of the specific behaviors listed below as indicative of Unsatisfactory Progress. It is a subjective judgment made by the Faculty Advisor and the Faculty Advisory Committee based on the quality, quantity, and timeliness of performance in research as well as the other activities described in the Graduate Student Handbook. The Faculty Advisor is expected to communicate his/her standards in these respects on a continual basis. These standards also provide the framework for the biannual reviews.

Unsatisfactory Progress: Unsatisfactory academic progress is *in part* determined on the basis of explicit requirements, including those outlined in the UC Merced Graduate Division's *Graduate Advisor Handbook* and reproduced here.

- An overall grade point average below 3.2; or
- A grade point average below 3.2 in two successive semesters; or
- Fewer than 8 units completed and applicable toward the advanced degree requirements in the last two semesters; or
- Failure to successfully pass second year research thesis.
- Failure to complete required courses or examinations satisfactorily within the period specified by the Graduate Group; or
- Failure to pass Qualifying or Dissertation Final Examination in two attempts; or
- Failure to progress academically within the Normal Time to Degree framework specified for the student's Graduate Group; or
- The appropriate faculty committee's evaluation that there has not been satisfactory progress toward completion of the dissertation; or
- Failure to fulfill TA duties.

Note however, that the professional judgment of the faculty assigned the role to evaluate the student, upon review of all graduate work undertaken by that student, *is paramount*. Faculty may establish more restrictive criteria than the above minimum criteria.

A judgment of Unsatisfactory Progress can have significant negative consequences for a graduate student including (but not limited to):

1. A student who has a GPA less than 3.2 in a single semester is at risk of being disqualified from obtaining an assistantship unless the employing unit wishes for them to continue to be employed; in that case, the Graduate Group Chair must request an exception from the Dean of the Graduate Division.
2. A student who has a D or F in a single course is disqualified from obtaining an assistantship. A grade of C in a single course is disqualifying unless the employing unit wants them to continue

to be employed; in that case, The Graduate Group Chair must request an exception from the Dean of the Graduate Division.

3. A graduate student who has not demonstrated satisfactory academic progress by any of the other criteria listed above is not eligible for any academic appointment or employment, such as a Teaching Assistantship, and may not receive fellowship support or other awards.
4. A graduate student who does not demonstrate satisfactory academic progress in two successive semesters may be dismissed from the graduate program at the discretion of the Graduate Group Chair in consultation with the Public Health Graduate Group faculty.

The Public Health Graduate Division delegates the monitoring of student performance regarding these rules to Director of Graduate Studies and the Registrar.

Communication of Unsatisfactory Progress: It is important to give students an early warning of potentially unsatisfactory progress. The Biannual Review specified above is a minimum. In addition, the Graduate Group Chair is encouraged to be direct in communicating orally, and in writing as necessary, with students demonstrating difficulties as soon as possible and on a continual basis. For example, course instructors are encouraged to engage in this communication, and to inform the Graduate Group Chair when a student is experiencing difficulties during a course, and not wait until the end.

It is useful for the Graduate Group Chair to keep a written record of all such communications. When notices of potential unsatisfactory progress are provided in writing to the student, a copy should also be retained in the Public Health Graduate Group files. The written communication should include specific details on areas that require improvement, provide an outline for future expectations of academic progress, and set meeting dates to maintain continuity in advisement. The purpose of the notice of unsatisfactory progress is to provide the student with a reasonable period of time (usually at least one academic semester) in which to make the necessary improvement in their academic status, and successfully complete their graduate study.

A formal determination of Unsatisfactory Progress in any Biannual Review may result in academic disqualification immediately or following a probationary period as determined by the faculty in the Public Health Graduate Group. A determination of academic disqualification will conform to the requirements and policies for disqualification of graduate students specified by the UC Merced Graduate Division's *Graduate Advisor Handbook*.

If the Graduate Group faculty offers the student probation, criteria must be specified in writing detailing what the student will need to achieve to be removed from this status if they are to be allowed to remain in the program, and the timetable for doing so. This is included in the written feedback provided to the student as part of the formal review. This information will be conveyed to the student by the Graduate Group Chair with an official copy of the letter being retained in Public Health Graduate Group files. Whenever a student has been deemed to make Unsatisfactory Progress, the Public Health Graduate Group reviews the student's progress at the end of the subsequent semester and determines his/her status at that

time. The professional judgment of the Public Health Graduate Group, upon review of all graduate work undertaken by that student, is paramount in determining whether the student can or cannot be removed from Unsatisfactory Progress status. While it is expected that the Graduate Group Chair will communicate with the student when in this status to provide guidance and feedback on efforts to meet the specified criteria, it is ultimately the student's responsibility to achieve progress that can be deemed Satisfactory Progress.

2.9 Relationship of Master's and Doctoral Program

The *Master's of Science in Public Health* is not intended as a stand-alone degree, but rather as an option for students admitted to the Ph.D. program. The optional MSPH serves as recognition of advancement in the degree program, though it is not a prerequisite for advancement. Ph.D. students will have the option to obtain a *Master's of Science in Public Health* degree, either en route to a Ph.D. degree (non-terminal), or in lieu of a Ph.D. degree (terminal) if a student exits the graduate program prior to fulfilling the Ph.D. requirements. The recipient of an MSPH degree is understood to possess knowledge of a broad field of learning that extends well beyond that attained at the undergraduate level, but is not expected to have made a significant original contribution to knowledge in Public Health or to be able to use sophisticated methodological tools to conduct independent research.

Requirements to receive the optional *Master's of Science in Public Health* are:

- Complete at least four semesters of academic residency at UCM
- Complete PH 201, PH 202, PH 203, PH 208a, PH 208b, Soc 210, Soc 211
- Complete the Discipline requirement (1 course)
- Complete the Advanced methods requirement (1 course)
- Complete 4 elective courses
- Complete 48 units of graduate coursework (all taken for a letter grade)
- Have a cumulative GPA no lower than 3.2
- Receive a Master's level "pass" on Second Year Research Thesis

Students who choose the MSPH degree en route to their Ph.D. (non-terminal) need only complete the Graduate Division form *Final Report for the Master's Degree* following the successful completion the Spring semester of their 2nd year of study. All other MSPH requirements will have been met at this point and the MSPH degree will be awarded at the end of the Spring semester, provided they meet the above criteria.

Students who opt for a terminal MSPH degree in lieu of the Ph.D. degree should inform their Faculty Advisor and the Graduate Group Chair of this decision prior to the start of their terminal semester (typically the Spring semester of their 2nd year). Students must complete the relevant portions of the Graduate Division form *Application for Advancement to Candidacy* at this time.

The Second Year Research Thesis will be graded using the rubric outlined in Appendix E3. A Master's

level “pass” will require less command of the material than a Ph.D. level “pass,” and the Public Health Graduate Group will determine the student's level of performance.

2.10 Special Preparation for Careers in Teaching

The Public Health Ph.D. program presents numerous opportunities for graduate students to gain teaching experience. To ensure that students acquire a range of relevant experiences serving as a teaching assistant (TA) or equivalent teaching experience is a requirement for earning the Ph.D. A student meets the teaching requirement by serving as a TA for no fewer than two semesters. In assigning courses for students, the Graduate Group Chair will seek to ensure that all students have an opportunity to TA for an introductory course (e.g., PH 01 or PH 05), a methods course (PH 111, PH 112 or PH 113), and an upper division course.

All students will be encouraged to participate in campus wide teacher training seminars. For example, the UC Merced Center for Research and Teaching (CRTE) run a series of seminars for graduate students to facilitate their development as an instructor. These seminars will provide the requisite training for our graduate students. All students will be encouraged to participate in these seminars, particularly during the 1st and 2nd years of the program.

Students who have advanced to candidacy may also satisfy two semesters of teaching assistantship by teaching one full course of their own design (subject to approval by the Dean of Graduate Students). It is expected that many students will, in fact, exceed these minimums and thus accrue even more teaching experience.

Table 5. Sample course of study

Prevention Sciences	
Fall Semester	Spring Semester
<u>1st Year</u>	
PH 201: Foundations of Public Health	Soc 210: Statistics 1: Regression Analysis*
PH 203: Research methods in Public Health	Elective
PH 202: Epidemiology	Elective or Discipline requirement
PH 208a: Professional seminar	PH 208b: Professional Seminar
	Summer: Research for Second Year thesis
<u>2nd Year</u>	
Soc 211: Statistics 2: Categorical Regression Analysis*	Elective or Advance Research Methods requirement
Elective or Discipline requirement	Elective
Elective	Elective
	Turn in Second Year Thesis
	Terminal MSPH student departs at end of 2nd
	Summer: Research experience with faculty or community or governmental organization
<u>3rd Year</u>	
Elective or Advance Research Methods	
Prepare for Qualifying Exam	Qualifying Examination
Formulate Candidacy Committee	Summer: Work on Dissertation Proposal
<u>4th Year</u>	
PH 299 Dissertation proposal and Defense	PH 299 Dissertation Research
PH 299 Dissertation Research	Summer: Work on Dissertation
<u>5th Year</u>	
PH 299 Dissertation Research	<i>Dissertation Research (complete and oral examination)</i>
	Defense of dissertation

2.11 Sample Program

The program shown in Table 5 demonstrates a typical course of study for the students.

2.12 Normative Time to Degree

While time to completion of the degree will vary, a general expectation is that students will complete the majority of their course work and complete the Second Year Research Project by the end of their 2nd year, pass their Qualifying Exam by the end of the 3rd year, pass their Dissertation Proposal and Defense by the middle of the 4th year, and defend their dissertation in their 5th year of study.

We anticipate that approximately one-third of our students will be capable of completing the degree in 4 years. We also anticipate that a small percentage may extend into a 6th year if necessary. Under exceptional circumstances, a student may be allowed to exceed six years, subject to university regulations and the approval of the Public Health Graduate Group Chair. As described in Section 2.8, regular review of students is an integral component of the program intended to ensure that students make timely progress.

Section 3: Projected Needs

Projecting student demand is an inexact science, but we cite indirect evidence from three sources: (1) popularity of Public Health among undergraduates, (2) demand for public health graduates, and (3) need for public health professionals in the San Joaquin Valley.

3.1 Student Demand:

Based on our consultations with the Directors of the Public Health Departments in the San Joaquin Valley, the Public Health faculty at California State University Fresno, health science faculty at California State University Stanislaus, representatives from other University of California campuses, and our student body, we anticipate our graduate program to be attractive to three groups of potential students:

1. Recent graduates with an undergraduate degree in Public Health, Human Biology, or other related disciplines;
2. Recent graduates with a Masters of Public Health from one of the Masters of Public Health programs at a California State University campus; and
3. Professionals working in Public Health field in the San Joaquin Valley or elsewhere in California who wish to pursue a Ph.D. in community based research.

In order to ascertain the interest in graduate study in Public Health among our students, we polled 150 Social Science and Natural Sciences students who were taking their first Public Health course (e.g., none had taken any Public Health courses), asking them to indicate their interest in pursuing a Minor in PH, a Major in PH, and/or a Graduate Degree PH. As shown in Table 6, there was a high level of interest in Graduate Degrees in Public Health.

Table 6: Interest in Minor, Major and Graduate Study in Public Health

	Minor in Public Health?	Major in Public Health?	Graduate study in Public Health?
Overall	58%	68%	71%
Social Science	54%	61%	67%
Natural Science	69%	90%	83%

As shown in Table 7, students expressed a high level of interest in each of the four areas polled, with

Natural Science students showing a particular interest in Environmental Health. However, interest was high in all areas of Public Health.

Table 7: Interest in Graduate Study in Public Health

	Health promotion /communication	Epidemiology	Environmental Health	Health policy
Overall	88%	82%	90%	83%
Social Science	89%	84%	89%	84%
Natural Science	86%	79%	93%	83%

Finally, we asked Professor Dele Ogunseitan, Chair of the Department of Population Health & Disease Prevention at UC Irvine, about the number of applications that they receive for their Ph.D. program (a program that has only been recently approved). Professor Ogunseitan reported that they receive approximately 50 applications for their program, and admit a cohort of seven students each year. As their program is similar to ours in terms of size and scope, this suggests that we might expect a similar number of applicants if we pursue an active recruitment strategy.

As indicated above, to the extent that the type of undergraduates currently attending UC Merced and our existing graduate students are representative of the type of graduate student we might attract in the future, our prospective students are likely to want to engage in research relevant to rural, underserved communities. Based on the student interest, our experience, and the experiences of the new program at UC Irvine, we anticipate receiving 50 applications per year, with the majority being from within California (at least initially), and accepting 7 students per year.

3.2 Opportunities for Placement of Graduates.

As stated above, a 2009 report from the University of California Office of Health Affairs encouraged UC Merced "(t)o address both regional needs and student interests, possible future development of new programs in other health professions, including perhaps programs in nursing and public health, where regional needs also exist."¹⁸ That same report also recommended a 50% increase in doctoral students across the UC system in Public Health by 2020,¹⁹ and that there is a growing demand for a more educated public health research work force at the national level and in California.²⁰ In particular, there is a need for graduate programs in public health research that can train students to address contextual health issues associated with the demographic and epidemiological shifts taking place in California.

Our proposed program fills a need to not only create a workforce that will educate future public health

¹⁸ Page 17. Office of Health Affairs. *A Compelling Case for Growth: Special Report of the Advisory Council on Future Growth in the Health Professions*. University of California Office of the President. 2009.

¹⁹ Ibid. Page 18.

²⁰ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2004. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf, page 12.

workers, but to train practice-oriented researchers who will work both inside and outside of academia. Labor market demand for Public Health researchers has been increasing, in both academia and more applied settings. Public health Ph.D. students not only work for governmental agencies at the federal, state, and local level, they work for healthcare financing and delivery systems, non-governmental public health organizations, and private industries.²¹ As a result, we anticipate that our graduates will help fill the a growing demand for trained public health researchers, and will help fill the need for mid-career training in the current public health workforce.

The need for a public health workforce with advanced training

An assessment of the state of public health in the United States sponsored by the **Centers for Disease Control and Prevention's Public Health Workforce Development Initiative** found that not only is there a workforce shortage,²² but that much of the workforce is untrained.²³ This assessment of the US public health workforce found that there was a mismatch between current workforce skills and projected needs.²⁴ In particular, the need to create practice-oriented researchers who conduct studies that improve public health practices was identified.²⁵ Individuals trained in scientific research will be needed to design and evaluate new and innovative public health interventions and to assess policy implications and policy costs.

While there is a growing demand for a more educated public health research work force at the national level, California, in particular, is plagued by a limited applicant pool for trained public health professionals. A 2014 report titled *Public Health Education and the University of California*²⁶ noted a strong demand for graduate programs in public health research education to help fill the need for researchers who can address contextual health issues associated with the demographic and epidemiological shifts taking place in California. Our graduates will help fill the need for trained public health researchers in both the public and private arena. In addition our program will help to fill the need for faculty members to train the next generation of public health researchers.

The need for additional mid-career training for public health professionals

A significant number of public health professionals with advanced degree work outside of academia. As a result, there is a growing demand for mid-career public health professionals (many of whom will already have a master's degree in public health) to receive additional advanced training (a doctorate) in public health in order to advance in their career. For example, the *Affordable Care Act* contains Mid-Career

²¹ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf. Accessed July 21, 2014.

²² Denise Koo. Modernizing the Workforce for the Public's Health: Shifting the Balance. Presented at *Public Health Workforce Summit, Modernizing the Workforce for the Public's Health: Shifting the Balance* in Atlanta, GA. December 13-14, 2012.

²³ Ibid.

²⁴ Fleming D. Destinations for a Public Health Workforce Roadmap, A Perspective from the Front Lines. Presented at *Public Health Workforce Summit, Modernizing the Workforce for the Public's Health*, Atlanta, GA. Dec 13-14, 2012.

²⁵ Ibid.

²⁶ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf, page 12.

Training Grants (section 5206) to support scholarships for mid-career public health professionals to gain further education in public health research,²⁷ and the Institute of Medicine has recommended that the number of nurses with a doctorate double by 2020.²⁸ The 2014 *Public Health Education and the University of California* report recognizes this and recommended increasing “enrollment of students with previous advanced degrees to increase the pool of broadly trained public health professionals.”²⁹ This demand for further scientific research training for mid-career public health professionals is represented in our current crop of graduate students, many of whom currently work in public health departments or are CSU nursing faculty, and are seeking to advance in their careers with a research degree.

Employment Opportunities

In addition to faculty jobs, graduates can seek employment in the private and public sectors. State, federal, and local governments routinely employ individuals with advanced Public Health degrees in positions such as social scientists, behavioral scientists, health scientists, program specialists, and analysts. In July 2014, a search of the CalJobs website yielded 31 positions using the keyword “public health” and 149 positions using the keyword “health research.” Similarly a search of the American Public Health Association’s CareerMart jobsite yielded 1,354 full time positions (both faculty and non-faculty). The Association of Schools of Public Health career website yielded 149 positions.

Training a successful Public Health researcher

The proposed program has been specifically designed to produce successful, marketable advanced public health researchers with a Ph.D. who should be competitive for academic and non-academic jobs alike. Students will be trained in core public health by faculty with degrees in both the natural and social sciences. The program will train researchers to work with diverse communities to identify solutions to the challenges facing the people of the region, will place students at the cutting edge of the discipline, and create much needed practice-oriented researchers who conduct studies that improve public health practices and, ultimately, population health. The strong programmatic emphasis on research and collaboration with faculty will likewise position the graduates for successful placement. In addition, our inclusion of required courses on professionalization and advanced methodology, along with an emphasis on publication of research and grant-writing, provide explicit training in areas that are critical to graduates’ professional success in a variety of public health career paths.

3.3 Importance to the Discipline

Our proposed Ph.D. in Public Health with a focus on *Prevention Sciences* aligns with the call to create researchers who conduct studies that improve public health practices.³⁰ Public Health is the science of

²⁷ American Public Health Association Center for Public Health Policy. Issue Brief June 2011: The Affordable Care Act’s Public Health Workforce Provisions: Opportunities and Challenges. http://www.apha.org/NR/rdonlyres/461D56BE-4A46-4C9F-9BA4-9535FE370DB7/0/APHAWorkforce2011_updated.pdf. Accessed July 21, 2014.

²⁸ Institute of Medicine (IOM). (2010). *The future of nursing: Leading change, advancing health*. Washington, DC.

²⁹ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/files/public_health.pdf. Accessed July 21, 2014, page 12.

³⁰ Ibid.

protecting and improving the health of the public through education, promotion of healthy lifestyles, and research regarding disease- and injury-prevention. Public Health professionals analyze the effects of genetics, personal choice and environmental forces in order to track the spread of diseases, understand health-related behaviors, and develop programs and policies that protect the health of families and communities.³¹ Overall, Public Health is concerned with protecting the health of entire populations, from those as small as a local neighborhood to those as large as an entire country or region of the world.

Our approach to training students to engage in Public Health research will be to emphasize the use of mixed methods and transdisciplinary approaches to research to address the prevention of chronic and infectious diseases in vulnerable populations in rural, underserved communities. As such our program will be important to the discipline in a number of ways:

- ***Training students in mixed methods and transdisciplinary approaches to research*** - For several decades, there has been growing interest and investment from the National Institutes of Health in promoting interdisciplinary and team-based research to address complex and multifaceted problems.³² This has led to the development of guidelines, practical tools, and best practice recommendations to support researchers interested in incorporating the related aspects of team science and transdisciplinary research into their research paradigms. In addition, many UC campuses have identified the importance of translational research, team science, and CBPR. This has been well recognized within the UC system, with most campuses having explicit training and research centers that touch on one or more of these aspects. These campuses have recognized the growing importance of these areas to health research in general and public health in particular.

The contribution of our proposed PhD program will be to train students to use transdisciplinary and team science approaches to address public health challenges. The training will also include how to work specifically with stakeholder groups (CBPR) in the design, development, implementation, and dissemination of the results. While this training is available at other UC campuses, our multidisciplinary faculty, relatively small size, and existing expertise of our faculty will allow us to provide students with high quality graduate training in mixed methods, transdisciplinary research, and team sciences approaches to addressing public health challenges.

- ***Focus on preventing chronic and infectious diseases*** - A recent report estimated that 39% of people in California suffer from at least one chronic condition, with the cost of care exceeding \$72 billion per year.³³ And infectious diseases, including influenza and pneumonia, remain the second leading cause

³¹ www.whatispublichealth.org/what/index.html

³² Stokols D, Hall KL, Taylor BK, Moser RP (2008). "The science of team science: overview of the field and introduction to the supplement." *Am J Prev Med* **35** (2 Suppl): S77–89.

³³ Brown, P. M., Gonzalez, M., & Dhaul, R. S. (2015). Cost of Chronic Disease in California: Estimates at the County Level. *Journal of Public Health Management and Practice*, *21*(1), E10-E19.

of death in California.³⁴ Shifting Californian demographic patterns have led to new challenges that affect health and create health disparities. California is now a minority-majority state,³⁵ and there is increasing research showing health disparities not only between, but within ethnic groups. Additionally, understanding the effects of generational status on health is becoming important, as there is increasing documentation of worse health outcomes at the second and third generation among Latinos.³⁶ Chronic and infectious diseases are projected to become a key public health issue due not only to an increase in the elderly population in California,³⁷ but by other social and behavioral factors.³⁸

These changes require a paradigm shift that no longer views the significant Californian Latino and Asian population as homogenous immigrant populations, but increasingly studies them by generational status. Additionally, these demographic shifts have led to the need for subgroup analysis in order to uncover hidden disparities (such as how diabetes prevalence varies among Asian and Latino subgroups),³⁹ or the need to understand how disparities in healthcare and healthcare access varies by racial/ethnic subgroup and condition.⁴⁰ These shifts in demographic patterns and health risk factors, including the emergence of chronic diseases as a public health crisis, and reemergence of infectious diseases (due to the opting out of vaccination and increased global travel)⁴¹ call for a larger public health workforce of practice-oriented researchers. Our Ph.D. program is designed to meet this need.

- **Training underrepresented ethnic/racial groups in Public Health** - Our program will serve to increase underrepresented ethnic/racial public health professionals. There is a dearth of underrepresented minorities, such as Latinos, African American, and particular Asian subgroups such as Hmong, in the field of Public Health. Per the *Public Health Education and the University of California* report, “[a]t UCB, only 5% of the [public health] students are African American and 4% are Hispanic. At UCLA, the figures are 7.9% and 9.8%, respectively.”⁴² Nationally only 9.4% of public health students are Hispanic. These figures include both doctoral and master’s student, so we

³⁴ California Department of Public Health. The Burden of Chronic Disease and Injury, California, 2013. Downloaded on July 5, 2014 from <http://www.cdph.ca.gov/programs/Documents/BurdenReportOnline%2004-04-13.pdf>

³⁵ Brown Jr. EG. Governor's Budget Summary 2014-15. In: California Department of Finance, ed. Sacramento, CA. January 10, 2014.

³⁶ Richard Fry and Jeffrey S. Passel. Latino Children: A Majority Are U.S.-Born Offspring of Immigrants. Pew Hispanic Center. May 28, 2009. <http://pewhispanic.org/files/reports/110.pdf>.

³⁷ California Department of Aging. 2004. Statistics and Demographics: Facts About California’s Elderly (<http://www.aging.state.ca.us/html/stats/demographics.html>)

³⁸ Center for Disease Control. Chronic Disease Prevention and Health Promotion. <http://www.cdc.gov/chronicdisease/>

³⁹ Demographic Changes, a View from California: Implications for Framing Health Disparities: Workshop Summary. Institute of Medicine. 2010. <http://www.iom.edu/Reports/2010/Demographic-Changes-A-View-from-California-Implications-for-Framing-Health-Disparities.aspx>

⁴⁰ OSHPD. Racial and Ethnic Disparities in Healthcare in California. 2010.

http://www.oshpd.ca.gov/hid/Products/PatDischargeData/ResearchReports/EthnicRacialDisp/RacialEthnicFactBook_2010.pdf

⁴¹ CDC. Immunization and Infectious Diseases. HealthyPeople.gov.

<http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=23>

⁴² Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf, page 12.

estimate the percentage decreases when only looking at doctoral students.

As mentioned above, UC Merced's current student population includes 60% first generation college students, with stated ethnicities that match the composition of young people across California - 45% Hispanic, 6% African American, and 25% Asian. To the extent that this is reflective of the type of students we are likely to attract, our graduate students will be interested in engaging in research relevant to rural, underserved communities. Given our location in the diverse SJV, diversity of the current undergraduate student population, and the type of student likely to be interested in this type of graduate study, our Ph.D. program can be expected to increase the population of underrepresented groups in the discipline.

3.4 Needs of Society

In their National Public Health Workforce Strategic Roadmap,⁴³ the Center for Disease Control calls for enhancing the education system by expanding public health instruction into schools and programs of public health. Our proposed program focuses specifically on research based Prevention Sciences. While we will provide students with exposure to the five core areas of public health, we will focus on providing expertise in working on health problems facing people in rural, underserved, ethnically diverse communities. This may include training in how to develop and evaluate programs and interventions aimed at eliminating health disparities using community-based, participatory research methods. The course of study is designed to expose the students to a variety of research methodologies that are common to Public Health, including epidemiology, health services research and analysis of secondary data sets, and a mixed method community-engaged approach to program design and evaluations that engage community members by building partnership, using inductive and deliberative processes where appropriate, and translating the results back into policy, practice, and/or behavior change.

The attributes of the SJV contribute to the increasingly complex challenges facing health care, workforce development and research education in not only the SJV, but in California. As such our program will help to create public health researchers who will also serve to benefit the community within which UC Merced is located. There are a significant number of health-related obstacles faced by individuals in this region. The SJV is home to some of the poorest counties and populations in California, and health outcomes, such as life expectancy, in the region vary greatly by location. Furthermore, the SJV is home to a significantly spatially segregated population, despite the fact that in 2009, Hispanics made up 48.5% of the SJV population. In 2009, 20.4% of households in the SJV had incomes below the federal poverty level and 46.2% of households in the SJV were considered poor or near poor. Over 25% of all Latinos in the SJV make less than the federal poverty level.⁴⁴ The SJV is home to a significant number of smaller, hard to reach minority populations whose health needs have not often been studied, including Assyrian, Bask,

⁴³ Center for Disease Control, <http://www.cdc.gov/ophss/csels/dsepd/documents/ph-workforce-strategic-roadmap.pdf>

⁴⁴ Joint Center for Political and Economic Studies, San Joaquin Valley Place Matters Team, Center on Human Needs Virginia Commonwealth University, Virginia Network for Geospatial Health Research. *Place Matters for Health in the San Joaquin Valley: Ensuring Opportunities for Good Health for All A Report on Health Inequities in the San Joaquin Valley*. Joint Center for Political and Economic Studies; March 2012.

Hmong, and Punjabi enclaves. Some counties (such as Madera) are home to enclaves of indigenous Mexicans (for whom Spanish is a second language) who migrate to the area seeking employment in the agricultural sector. In addition to issues such as poverty and a depressed labor market, families in the region also face challenges to health and health care access relating to status as undocumented immigrants.

The population of this region faces significant health risks for chronic diseases. 10.7% of the adult population in the SJV has been diagnosed with diabetes (compared to 8.1% for the rest of California excluding SJV) and 30.5% have been diagnosed with high blood pressure (as opposed to 26.9% elsewhere). 15.2% of the adults and teens smoke (compared to 12.4% elsewhere) and 70.1% of adults are overweight or obese (compared to 58.7% elsewhere).⁴⁵ The region itself poses a health hazard to residents as air quality is notorious unhealthy,⁴⁶ and SJV is host to *Coccidioides immitis* and *Coccidioides posadasii* (documented incidents of valley fever, Coccidioidomycosis, have been increasing in the SJV).⁴⁷ We believe the mission of our proposed graduate program will benefit the SJV region and provide much needed research on rural and hard to reach ethnic minority populations. We expect that graduates of the degree program will not only focus on the creation of knowledge about emerging public health problems in hard to reach communities, but on identifying solutions that are translated back to the community, thereby increasing the research capacity for public health in California and the nation.

3.5 Relationship of Program to Faculty Research and Interests

The University of California's *Public Health Education and the University of California* called for schools to increase faculty in particular areas, including environmental health sciences, immunology, and social and behavioral epidemiology,⁴⁸ which are fields represented by the faculty associated with the Public Health graduate group at UC Merced (see Appendix A). The disciplines of our faculty (including the Prevention Sciences candidate) are:

- Health disparities - 5 faculty members
 - Gonzalez, Ramirez, Song, Burke, and Diaz Rios
- Behavioral medicine - 3 faculty members
 - Cameron, Wallander, Wiebe
- Environmental health - 2 faculty members
 - Cisneros, Joyce
- Health economics - 2 faculty members
 - Brown, Schnier
- Immunology - 2 faculty members

⁴⁵ CHIS. CHIS 2005 -2012 [computer file]. Los Angeles, CA: UCLA Center for Health Policy Research. <http://ask.chis.ucla.edu>.

⁴⁶ Plevin, Rebecca. Is The Central Valley's Air Pollution Affecting Our Cells and Genes? Valley Public Radio. January 28, 2014. <http://kvpr.org/post/central-valleys-air-pollution-affecting-our-cells-and-genes>

⁴⁷ Valley Fever Risk in the San Joaquin Valley. Health Sciences Research Institute. <http://environmenthealth.ucmerced.edu/valley-fever>

⁴⁸ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/_files/public_health.pdf. Accessed July 21, 2014, page 13.

- Ojcius, Barlow
- Epidemiology - 1 faculty member
 - Goldman-Mellor
- Public health genetics - 1 faculty member
 - Wooding
- Child & developmental health - 1 faculty member
 - Gilger

Our faculty conduct research that is relevant to prevention sciences. In addition, many of our faculty use mixed methods in their research and engage in transdisciplinary research and CBPR. Faculty have experience in leading research projects on health disparities, chronic disease prevention, and infectious diseases.

- **Ricardo Cisneros** (MPH, Ph.D. in Environmental Health) is researching the impact of forest fires and regional air quality and the health of people in rural areas of the SJV and the surrounding mountain communities, particularly those who suffer from chronic conditions such as asthma or COPD. His research has implications for how best to manage contained burns so as to minimize the negative health impacts on communities throughout the west. His research has been funded by the USFS.
- **Susana Ramirez's** (MPH, Ph.D. in Health Communication) research focuses at the intersection of public health and communication science and health disparities. She focused substantively on cancer prevention and Latino health including two main lines of inquiry: (1) Understanding the health information needs and seeking behaviors of Latinos and (2) Developing culturally tailored interventions. Her work with Latino communities to promote healthy lifestyles is particularly relevant to this proposal. The funders of her research include NIH and USAID.
- **Mariaelena Gonzalez** (MPH, Ph.D. in Medical Sociology) is examining how the environmental and social factors can contribute to health disparities by promoting or constraining the behavior of individuals, organizations, institutions, or policy makers. This includes examining how smokefree laws contribute to tobacco denormalization and identifying factors that may mediate the relationship between tobacco-related behaviors and other positive (home smokefree rules) or negative (food insecurity) outcomes. Her research and teaching addresses health disparities in Latino communities, and thus will be of particular interest to our targeted student population. Her research has been supported by the CDPH.
- **Karina Diaz-Rios** (MMedSc, Ph.D. in Nutrition) is interested in promoting healthy nutrition in disadvantaged communities. As a University of California's Division of Agriculture and Natural Resources (ANR) specialist located at UC Merced, she is connected with a larger team of nutrition researchers and educators throughout the UC system to address issues related to healthy food and human health. Her position as an ANR Specialist will provide her the opportunity to work with graduate students on research relevant to vulnerable communities.

- **Stephen Wooding's** (Ph.D. in Anthropology) expertise in public health genetics is used to examine implications of the molecular evolution of taste perception, including its role in explaining addictive behaviors such as tobacco and other stimulants. This includes examining genetic diversity among Hispanics, with the goal being to map specific genetic effects to chronic diseases in Hispanic communities. His research has been funded by the NIH.
- **Sidra Goldman-Mellor** (MPH, Ph.D. in Epidemiology) research explores the relationship between these disorders, social disadvantage and chronic disease. Her current work is aimed at understanding the life-course development of internalizing behavior disorders, such as depression, anxiety, and suicidal behavior, and the extent to which these behaviors are associated with social disadvantage, violence, and chronic disease.
- **Paul Brown** (Ph.D. in Economics) is a health economist with research interests in evaluation and cost effectiveness analysis, assessing unmet need for disadvantaged populations, and behavioral economics. Much of his work falls under the broad category of Public Health Services and Systems Research, including examining the role that local health departments (LHDs) play in promoting access and ensuring quality of care for health services to vulnerable communities. The funders of his research include NCI, CDPH, and the Robert Wood Johnson Foundation.
- **Andrea Joyce** (Ph.D. in Entomology) has a specialty in environmental health, with research that includes examining population genetics and research on alternatives to insecticides such as biological control, for insect populations of agricultural and public health importance. Given the heavy use of pesticides in agricultural regions, her work is pertinent to understanding the interaction between the environment and human health.
- **Linda Cameron** (Ph.D. in Health Psychology) focuses on developing health communications and psychosocial interventions for individuals who have or are at risk for illnesses such as cancer, heart disease, and diabetes. In her health communications research, she is exploring the impact of visual images and animations on responses to risk communications such as graphic warning labels for tobacco products and information about genetic testing for disease susceptibility. Funders of her research include NCI and international grant agencies.
- **Deborah Wiebe** (MPH, Ph.D. in Clinical Psychology) is building a transactional developmental model to understand how children with type 1 diabetes and their parents cope with the illness across adolescence, including examining the longitudinal aspects parental involvement in diabetes management across the transition into and through adolescence. Funders of her research include NIH and NINR.
- **Jeff Gilger** (Ph.D. in Developmental Psychology) research aims to describe and understand the brain mechanism, genetics, and behavioral expressions of such individuals. This work has implications for our understanding of how the brain develops, and important applications to the fields of learning disabilities and the basis of talent/high ability development. Funders of his research include California First Five.
- **Jan Wallander's** (Ph.D. in Clinical Psychology) research focuses on health psychology and developmental psychopathology, including interactions between behavior and health in

children and adolescents; effects of chronic disease or disability on quality of life in childhood; and behavioral interventions to improve health and quality of life in children and adolescents His research funding has come from multiple sources, including NIH, the California Endowment, and the CDC.

- **Kurt Schnier** (Ph.D. in Economics) is interested in policy analysis in the fields of health and resource economics. His health research focuses on the response of physicians and hospitals to current and impending regulations that impact the provision of health care. His research has been funded by NIH, NSF, and the USDA.
- **David Ojcius** (Ph.D. in Biophysics) research includes the use of molecular and cell biological techniques to characterize interactions between epithelial cells and intracellular pathogens, using bacteria and Chlamydia as a model system. He is currently leading a research team investigating conditions such as Valley Fever. His research has been funded by NIH.
- **Miriam Barlow** (Ph.D. in Biology) research uses experimental evolution to study antibiotic resistance. Her research is focused on discovering new properties of evolution and new ways of treating antibiotic resistance. Her research has been funded by NIH.
- **Anna Song's** (Ph.D. in Health Psychology) research focuses on psychosocial factors that influence adolescent and young adult risk behavior decision-making. Risk behaviors that are of interest to include a) smoking initiation, progression, and cessation, b) sex initiation, c) gambling, and d) unhealthy eating patterns. She is also interested in adolescents' and young adults' beliefs about risks, benefits, and future consequences associated with behaviors, as well as cultural factors that might explain and reduce health disparities. The funders of her research include TRDRP and NCI.

In addition, an offer has been made and accepted by a new member of the faculty. Nancy Burke will join the faculty in July 2015 as an Associate Professor in Prevention Sciences. Her transdisciplinary research addresses health disparities among vulnerable populations through community-based participatory research. She has an impressive publication record, history of securing grant funding (she is currently the PI on an R01 entitled "Health literacy systems in the safety net" sponsored by the National Institute of Nursing Research at NIH, the PI on an R21 entitled "Addressing oral health literacy among Mexican Immigrants" funded by the National Institute of Dental and Craniofacial Research at NIH, and a PI or Co-PI on a number of other grants totaling over \$2 million), and strong interest and expertise in research methodology, including mixed methods evaluation research. She brings outstanding leadership skills to the graduate program, the Health Sciences Research Institute, and the Resource Center for Community Engaged Scholarship (ReCCES). Given Dr. Burke specialization in studying mono-lingual immigrants and native peoples, her expertise will be invaluable to graduate students looking to work with communities in the San Joaquin Valley, including ethnic minority populations such as Hmong, Laotian, Punjabi, Native American, and Indigenous Mexican communities (such as the Oaxacan community in Madera).

3.6 Program Differentiation

In California, there are currently seven Schools of Public Health in existence or proposed (UCLA, UC

Davis, UC Berkeley, UC Irvine, USC, Loma Linda, and Claremont), one joint MPH/Ph.D. program (UCSD/SDSU), and a number of programs that offer a terminal MPH degree (Fresno State University, Cal State Northridge, Long Beach State, Cal State Fullerton, San Francisco State, and San Jose State). There is no Ph.D. program in the San Joaquin Valley.

As mentioned above, we feel our program can complement existing programs by providing students with specific training in translational research, including conducting community based participatory research (CBPR). By using our existing strengths on campus - culture of transdisciplinary research, diverse and dedicated faculty, existing resources on campus (e.g., HSRI, ReCESS and the Blum Center) - our program in *Prevention Sciences* will provide students with a unique opportunity to work on issues relevant to rural and vulnerable communities. While other UC campuses offer the type of academic Ph.D. that we are proposing, including training in Prevention Sciences (or equivalent), community based participatory research (CBPR), and the dissemination and implementation of the results (translational research), the transdisciplinary nature of our campus and faculty, our accessible to understudied (e.g., rural and vulnerable) populations in the San Joaquin Valley, and our commitment to providing students with a course of study that prepares them to work in transdisciplinary teams, is unique in the UC system.

Evidence of the transdisciplinary nature of our research can be seen in a number of ongoing collaborative efforts by faculty, post doctoral researchers, and students (both at the graduate and undergraduate level) at UC Merced. For instance, one project involves a cross disciplinary collaborative (with researchers from other schools) to examine Valley Fever both in the laboratory and at the patient level (researchers include Drs. Brown, Gabe, Ridgeway, Ojcius, and Barlow). Another example is the work (funded by the National Cancer Institute) to test the SmokefreeTXT mHealth program among Latinos in the SJV region. The work involves both health psychologists and health communication specialists (Drs. Cameron and Ramirez). In the project estimating the cost of chronic diseases incurred for each county in the state (funded by the California Department of Public Health; CDPH) involved a health economist (Dr. Brown), medical sociologist (Dr. Gonzalez), and a graduate student (Ritem Sandhu). Other collaborations include examining the impact of social capital on health-related behaviors (Drs. Gonzalez, Ramirez, and Brown), examining the relationship of risks behaviors (including unhealthy eating, smoking, and alcohol consumption) among first, second, and third generation Latinos (Drs. Gonzalez, Diaz-Rios, and Song), understanding the relationship between unhealthy food consumption and asthma severity (Drs. Cisneros and Gonzalez), and studying the impact of the creation of a mobile food van and related campaigns (Drs. Valdez and Ramirez). Additional faculty collaboration includes involvement in research proposals to study the marketing of e-cigarettes to Latinos the region (Drs. Gonzalez, Song, Brown, and Cameron), and the creation of a Translational Research Group, which is actively working with community organizations to design research projects of use to the region. These are only some of the many existing projects that demonstrate the collaborative nature of our research.

The core program curriculum focuses on training students in research methods, with other course offerings focusing on areas where faculty have research expertise. Thus, graduate students will obtain

training in a number of public health areas, and faculty will have the opportunity to teach graduate courses in their area of specialization. For example, Dr. Ramirez will teach Health Communication, Dr. Gonzalez will teach Social Epidemiology & Health Disparities, and Dr. Cisneros will teach Environmental Health. We have hired faculty with an eye toward offering the proposed graduate program, and at the same time tailored the graduate program to fit the strengths of our faculty. The result will be a cohesive and high quality graduate program. By focusing on Prevention Sciences, and on inter-disciplinary and collaborative research, we will provide our students with a broad set of tools to research health among rural and hard to reach populations. Students will also obtain a background in environmental health sciences, and social and behavioral epidemiology from core Public Health faculty, and will have the option to engage in inter-disciplinary research with Public Health faculty affiliates in Psychology and Molecular and Cell Biology who study immunology.

We aim to recruit students who particularly desire to study health disparities and to engage in Prevention Science research that will have an impact on local communities, the foundation for which we are already establishing at Merced. The focus on public health research within the local community has been fostered by the Health Science Research Institute (of which Dr. Brown, the head of Public Health is a director) and by the Health Psychology group. In addition, a Blum Center has recently been introduced on campus to address research on poverty in the SJV region. UC Merced has all the ingredients to develop this kind of practice based, locally focused, training program. The broader approach will help students to prepare for public health careers that can deal with emerging public health challenges that California faces.

Section 4: Faculty

Introduction

The Public Health Graduate Group is composed of sixteen faculty with primary appointments in several Bylaw 55 units, including Public Health and Psychology (part of Psychological Sciences), Economics, and Molecular and Cell Biology (part of the Quantitative Systems Biology Bylaw 55 unit). Public Health is a rapidly growing, uniquely transdisciplinary area at UC Merced. Our faculty include researchers with expertise in the five major subfields of public health (environmental health, health behavior and communication, epidemiology and health services research and policy), and specific strengths in health disparities, social epidemiology, and the biological bases of public health (e.g., public health genetics and infectious diseases).

The academic and professional qualifications of all faculty are high. There are seven senior-level (full Professors) and nine junior faculty (Assistant Professors). All senior faculty have proven track records of successful publications within Public Health or related fields, track records of successful funding from NIH, NCI, CDC, Robert Wood Johnson, and many other grant sources, and international reputations in their fields. In addition, all have successfully supervised graduate students at other institutions and at UC Merced. All members have maintained high publication rates, with articles in the top journals in their specific fields as well as high profile cross-disciplinary journals (Appendix A). Our success in establishing a strong faculty base thus far places us in an advantageous position to recruit more talent,

strengthening our program as it grows. A particularly important aspect of our faculty is that its research breadth and accomplishments are enabling us to develop a far reaching role at the university, supporting public health priorities in diverse areas such as Sociology, Psychology, and Systems Biology. This role is highly significant at UC Merced, whose student demographics represent populations particularly vulnerable to public health challenges and sorely in need of research and training opportunities.

The senior faculty associated with Public Health can help mentor and support the new faculty in a number of ways, including involving the faculty in funded research and in developing applications of funding of new research projects. In addition, through our mentor program, junior faculty associated with Public Health have an internal mentor as well as the opportunity to have a funded external mentor at other UC Campus. In addition, the wider Public Health group (which included all members of the Graduate Group plus additional affiliated members) meet regularly to discuss the training and support needs of junior faculty on campus. As such, Public Health is a well functioning entity on campus and the junior faculty have sufficient support, resources, and mentorship to allow them to be successful academics.

Section 5: Courses

There are 11 required courses at the undergraduate level (PH 01, 05, 100, 102, 103, 105, 108, 111, and 181) that must be offered each year, and 7 courses at the graduate level (PH 201, 202, 203, 208a, 208b, Soc 210, and Soc 211) that must be offered each semester. There are also a number of courses that must be offered every other year at the graduate level so that students can fulfill the Discipline (PH 204, 205, 206, and 207) and Advanced Methods (223, 224, and 227) requirements. The course of study requires the students to take the sociology statistics sequence (SOC 210 and SOC 211), although other sequences (e.g., PSY 202a and 202b) can be taken should SOC 210 and 211 be unavailable, or we can consider offering a specialized statistics sequence for Public Health students. Taken together, an average of 17 four unit courses that must be offered to undergraduate and graduate Public Health students each semester.

The normal course load for a new faculty in the School of Social Sciences, Humanities and Arts at UC Merced is two courses during their first year and three courses per year after that. At the graduate level, all courses must be taught by ladder ranked faculty. Under the conservative estimate that there are no new hires between 2015 and 2020, and only counting the ladder ranked faculty hired who identify as being solely in Public Health, then there would be 7.5 FTEs (Brown, Gonzalez, Ramirez, Goldman-Mellor, Wooding, Ramirez, .5 Joyce, and the Prevention Sciences hire), or 22 four unit courses per year. In addition, lectures can be used when needed to serve the introductory courses (PH 01 and 05), and a faculty member from UCSF-Fresno (Paul Mills) has taught Epidemiology one semester (PH 100). Thus, from a macro perspective, there is sufficient staff to cover the required courses.

As discussed above under the program, the course of study includes a number of elective courses. Some of the electives will be offered through the Public Health graduate program, and others offered as part of other graduate programs. Students can choose from 10 elective Public Health designated courses (PH 221, 222, 235, 236, 241 and the Discipline and Advanced Methods

Table 8. Undergraduate and Graduate course offerings in Public Health

	Required courses	Frequency	Lead Instructor	Units
PH 01: Introduction to Public Health	Required	Annual	Cisneros	4
PH 05: Global Public Health	Required	Annual	Gonzalez	4
PH 100: Introduction to Epidemiology	Required	Annual	Goldman-Mellor	4
PH 102: Health Behavior and Promotion	Required	Annual	Ramirez/Staff	4
PH 103 Health Communication	Required	Annual	Ramirez	4
PH 105: Introduction to US Healthcare	Required	Annual	Brown	4
PH 108: Introduction to Health Care	Required	Annual	Prev. Sciences**	4
PH 110 Environmental Health	Required	Annual	Cisneros	4
PH 111 Social Epidemiology *	Research Methods	Bi-annual	Gonzalez	4
PH 112 Health Services Research *	Research Methods	Bi-annual	Brown	4
PH 113 Latino and Immigrant Health	Optional	Bi-annual	Gonzalez	4
PH 115 GIS Mapping *	Research Methods	Bi-annual	Cisneros	4
PH 181: Public Health Research	Required	Annual	Wooding	4
PH 201: Foundations of Public Health	Core	Annual	Prev Sciences	4
PH 202: Epidemiology	Core	Annual	Goldman-Mellor	4
PH 203: Research Methods	Core	Annual	Gonzalez	4
PH 204: Environmental Health	Discipline	Bi-annual	Cisneros	4
PH 205: Health Services Res. & Policy	Discipline	Bi-annual	Brown	4
PH 206: Health Communication	Discipline	Bi-annual	Ramirez	4
PH 207: Social and Behavioral Theory	Discipline	Bi-annual	Prev Sciences	4
PH 208a: Professional Seminar	Core	Annual	Ramirez	2
PH 208b: Professional Seminar	Core	Annual	Joyce	2
PH 221: Social Epi. & Hlth. Disparities	Elective	Occasional	Gonzalez	4
PH 222: Program Design & Evaluation	Elective	Occasional	Prev Sciences Hire	4
PH 223: Qual. Res. Methods for PH	Av Methods	Bi-annual	Prev Sciences Hire	4
PH 224: Environmental Epidemiology	Av Methods	Bi-annual	Cisneros	4
PH 227: Advanced Public Health Research	Av Methods	Bi-annual	Brown	4
PH 235: Pesticides, Health, Environment	Elective	Occasional	Joyce	4
PH 236: Vector Ecology for Public Health	Elective	Occasional	Joyce	4
PH 241: Public Health Genetics	Elective	Occasional	Wooding	4
ES 234: Air Pollution and Resources	Elective	Occasional	Env. Sci. Faculty	3
PSY 202C: Multivariate Analysis	Elective	Annual	Depaoli	4
PSY 208A: Methods for Program	Elective	Annual	Shadish	4
PSY 208B: Theory of Program Evaluation	Elective	Annual	Shadish	4
PSY 206: Quant. Meth. for Rev. Research	Elective	Annual	Vevea	4
PSY 220: Health Psychology	Elective	Annual	Cameron	4
PSY 221: Issues in Health Psychology	Elective	Annual	Wallander	4
PSY 224: Health Disparities	Elective	Annual	Song	4
PSY 225: Health Risk Decision Making	Elective	Occasional	Wiebe	4
PSY 230: Developmental Psychology	Elective	Annual	Gilger	4
PSY 280: Human Behavioral Genetics	Elective	Occasional	Gilger	4
SOC 210: Statistics 1: Regression	Elective	Annual	Dodson	4
SOC 211: Statistics 2: Categorical	Elective	Annual	Dodson	4
Soc 230: Stratification	Elective	Occasional	Lopez	4
Soc 245: Sociology of Health	Elective	Annual	Laster	4
PH 299: Public Health Ph.D. Dissertation	Required	Annual	Staff	2 to 12

* Students must take PH 111, PH 112, or PH 115

** Prevention Sciences faculty member slated to join UC Merced on July 1, 2015.

Table 9. Sample teaching grid

	2016/17	2017/18	2018/19	2019/20	2020/21
<i>Undergraduate courses</i>					
PH 01: Introduction to Public Health	Cisneros	Cisneros	Cisneros	Cisneros	Cisneros
PH 05: Global Public Health	Gonzalez	Staff	Gonzalez	Staff	Gonzalez
PH 100: Introduction to Epidemiology	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor
PH 102: Health Behavior and Promotion	Ramirez	Staff	Ramirez	Staff	Ramirez
PH 103 Health Communication	Ramirez	Ramirez	Ramirez	Ramirez	Ramirez
PH 108: Introduction to Health Care	Prev. Sci.	Prev. Sci.	Prev. Sci.	Prev. Sci.	Prev. Sci.
PH 105: Introduction to US Healthcare	Brown	Brown	Brown	Brown	Brown
PH 110: Environmental Health	Cisneros	Joyce	Cisneros	Joyce	Cisneros
PH 111 Social Epidemiology		Gonzalez		Gonzalez	
PH 112 Health Services Research	Brown		Brown		Brown
PH 113: Latino and Immigrant Health		Gonzalez		Gonzalez	
PH 115 GIS Mapping		Cisneros		Cisneros	
PH 135 Public Health Genetics		Wooding		Wooding	
PH 137: Insects and Public Health	Joyce		Joyce		Joyce
PH 181: Public Health Research	Wooding	Wooding	Wooding	Wooding	Wooding
PH 185: Health and Bioethics		Staff		Staff	
<i>Graduate Courses</i>					
PH 201: Foundations of Public Health	Prev. Sci.	Prev. Sci.	Prev. Sci.	Prev. Sci.	Prev. Sci.
PH 202: Epidemiology	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor	Goldman-Mellor
PH 203: Research Methods in Public	Gonzalez	Ramirez	Gonzalez	Ramirez	Gonzalez
PH 204: Environmental Health	Cisneros		Cisneros		Cisneros
PH 205: Health Services Res. & Policy		Brown		Brown	
PH 206: Health Communication		Ramirez		Ramirez	
PH 207: Social and Behavioral Theory	Prev. Sci.		Prev. Sci.		Prev. Sci.
PH 208a: Professional Seminar	Ramirez	Ramirez	Ramirez	Ramirez	Ramirez
PH 208b: Professional Seminar	Joyce	Joyce	Joyce	Joyce	Joyce
PH 221: Social Epi. & Hlth. Disparities		Gonzalez		Gonzalez	
PH 222: Program Design & Evaluation		Brown		Brown	
PH 223: Qual. Res. Meth. For Public		Prev. Sci.		Prev. Sci.	
PH 224: Environmental Epidemiology		Cisneros		Cisneros	
PH 227: Advanced PH Research	Brown		Brown		Brown
PH 235: Pesticides, Health, Envir.				Joyce	
PH 236: Vector Ecology for Public			Joyce		Joyce
PH 241: Public Health Genetics	Wooding		Wooding		Wooding

Table 10. Teaching requirements for Public Health faculty *

	2016/17	2017/18	2018/19	2019/20	2020/21
Brown	PH 105 PH 112 PH 227	PH 105 PH 205 PH 222	PH 105 PH 112 PH 227	PH 105 PH 205 PH 222	PH 105 PH 112 PH 227
Cisneros	PH 01 PH 110 PH 204	PH 01 PH 115 PH 224	PH 01 PH 110 PH 204	PH 01 PH 115 PH 224	PH 01 PH 110 PH 204
Goldman-Mellor	PH 100 PH 202	PH 100 PH 202 PH 205	PH 100 PH 100 PH 202	PH 100 PH 202 PH 205	PH 100 PH 100 PH 202
Gonzalez	PH 05 PH 111 PH 203	PH 05 PH 111 PH 221	PH 05 PH 111 PH 203	PH 05 PH 111 PH 221	PH 05 PH 111 PH 203
Joyce	PH 137 PH 208b	PH 110 PH 208b PH 235	PH 137 PH 208b	PH 110 PH 208b PH 235	PH 137 PH 208b
Ramirez	PH 102 PH 103 PH 208a	PH 103 PH 206 PH 208a	PH 102 PH 103 PH 208a	PH 103 PH 206 PH 208a	PH 102 PH 103 PH 208a
Wooding	PH 135 PH 181	PH 181 PH 241	PH 135 PH 181	PH 181 PH 241	PH 135 PH 181
Prevention Sciences Hire	PH 108 PH 201 PH 207	PH 108 PH 201 PH 223	PH 108 PH 201 PH 207	PH 108 PH 201 PH 223	PH 108 PH 201 PH 207
Staff	PH 01 PH 05 PH 100 PH 102	PH 01 PH 05 PH 100 PH 102	PH 01 PH 05 PH 100 PH 102	PH 01 PH 05 PH 100 PH 102	PH 01 PH 05 PH 100 PH 102

courses) and 13 courses offered as part of other graduate programs, including from Psychology (PSY 202c, 208a, 208b, 206, 220, 221, 224, 225, 230, and 280; SOC 230 and 245, and ES234). While the decision of when to teach these other elective courses will be made by the other graduate programs, the majority have been offered regularly in the past. Given that students are required to take 6 elective courses from a possible 23, there are sufficient options for the students. In order to demonstrate that there are sufficient teaching resources to provide the graduate program, the table below summarizes the potential course offerings under the conservative assumption that there are no additional ladder ranked faculty lines between 2015 and 2020. The title of the course is provided along with a column indicating whether or not the course is a required or elective course in the program and the instructor(s) expected to teach the course. All courses will be approved at prior to the anticipated offering. In this way, we can ensure that the courses have ample time to be reviewed by the Academic Senate’s Graduate and Research Council and UC Merced’s Registrar. Catalog descriptions of

Table 11. Public Health Ph.D. Program Resource Requirements

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
FTE Faculty	2 hired (Goldman-Mellor and Wooding)	1 new hire (Prevention Sciences) (Note: already approved)	1 new hire (Health Disparities/Promotion)	1 new hire (Environmental Epidemiology)	1 new hire (Health Services Research)	1 new hire (Prevention Sciences)
Library Acquisition		\$40,000 to \$45,000 per year	\$40,000 to \$45,000 per year	\$40,000 to \$45,000 per year	\$40,000 to \$45,000 per year	\$40,000 to \$45,000 per year
Computing Costs	Shared computer lab	Shared computer lab	Shared computer lab	Shared computer lab	Shared computer lab	Shared computer lab
Equipment	--	--	--	--	--	
Space and other capital facilities	Graduate student work space	Graduate student work space	Graduate student work space	Graduate student work space	Graduate student work space	Graduate student work space
Other operating costs	--	--	--	--	--	

all courses are in Appendix D and sample syllabi for three substantive courses are included in Appendix E1. In order to ensure adequate coverage of material, consistency in the program, and high standards, all faculty will be asked to submit syllabi to the Graduate Studies Committee.

Section 6: Resource Requirement

At this time, the six graduate students studying Public Health are doing so under the Social Science Graduate Group umbrella. Once the Public Health Graduate Group is approved, the Social Sciences Graduate Group will no longer offer a track in Public Health. Therefore, the public health faculty and graduate students associated with the Social Sciences Graduate Group will be transferred to the new graduate program in Public Health. The administration of the current program is provided by the Dean of SSHA, and will continue once the Public Health Graduate program is approved.

6.1 FTE Faculty

The proposed graduate program can be offered with the existing resources at UC Merced. As shown in Table 1, under the conservative assumption that we have no need faculty lines in the future and only those faculty fully associated with Public Health serve as primary supervisors (8.5 FTEs), there is sufficient capacity to offer the undergraduate and graduate courses, and to provide adequate supervision to graduate

students. That said, the program can expand with additional resources.

While the number of new faculty lines will ultimately depend upon the success of the undergraduate program, the number of quality graduate students we can attract, and the outcome of the Strategic Focusing Initiative, our hope would be to hire one new faculty per year for the next 4 years. This would bring the number of FTEs with a primary affiliation with Public Health to 12.5 and enable us to expand the program offering in other areas (e.g., Environmental Health and Health Services Research). As per our strategic plan, we would look to hire a researcher with an expertise in health promotion and health disparities (to start 2016/17), an environmental epidemiologist (to start in 2017/18), a health services researcher with an expertise in health policy (to start in 2018/19), and an additional hire in Prevention Sciences focused on working with communities groups to stem infectious diseases (Table 11).

Funds for new faculty lines, and for associated startup costs, are allocated by the Provost through the strategic planning process, with consultation by pertinent UC Merced Academic Senate committees.

6.2. Library Acquisition

The current library holdings need to be expanded to support health-related faculty research. Judging by the number of faculty affiliated with HSRI (77 as of December 2014), there is currently significant demand for additional health-related resources irrespective of the needs of Public Health graduate students. All faculty and health-related graduate students, including those in Health Psychology, Public Health, and Molecular and Cell Biology, would benefit from an expansion of the library resources.

As shown in Table 11 and documented in Appendix C in the letter from Jim Dooley dated August 4, 2014, the cost of additional library holdings is estimated to be between \$40,000 to \$45,000 per year. This is based on a review a list of journal holdings provided by the public health library at UC Berkeley and estimate that the annual subscription cost for access to journals in support of public health and health psychology, and a subscription to the Journal of the American Medical Association (JAMA) and New England Journal of Medicine (NEJM). Mr. Dooley states that UC Merced has been provided gratis access to Mary Ann Liebert journals since the campus opened. If this changed, the cost could be as much as \$5,000 per year. Finally, the acquisition of e-books and reference works from health-related societies and commercial publishers could cost \$5,000 per year.

6.3 Computing Costs

Public Health graduate students currently have access to computers in the Graduate Computing Lab for coursework and research. Cost savings might be achieved by establishing graduate computing labs that are shared across disciplines. Faculty in many disciplines including Public Health, sociologists, political scientists and psychologists, in particular, often use similar software, including statistical packages. No new resources are required regarding university-wide computer resources. Each incoming faculty member will require a personal computer and specialty software for their office. Those resources will be obtained as part of the normal startup costs allocated to the University for the recruitment of new faculty.

6.4 Equipment

Public Health Graduate Group faculty have varying equipment needs for their research. We expect these needs to be met with the normal start-up packages allocated to the University for the recruitment of new faculty. As a result, no additional resources will be needed with respect to equipment.

6.5. Space and Other Capital Facilities

Public Health requires one office per faculty member. Graduate students currently have access to shared office and/lab space (SSM 343, 343a, and 305) and a secure room for data (SSM 344). In addition, there are four cubicles dedicated to the current Public Health graduate students. Taken together, there is sufficient space to house our projected number of graduate students between now and 2020. Space is also available at the Castle Facility for faculty and graduate students who require experimental laboratory facilities. Graduate students also have access to the computing facilities available to all students at UC Merced.

6.6. Other Operating Costs

Staff support for graduate students in Public Health is coordinated by Mr. Mitch Ylarregui. Mr. Ylarregui and his staff currently administer all programs housed under SSHA. As the current coordinator for the Social Sciences Graduate Group, it is expected that Mr. Ylarregui will become the coordinator of the Public Health Graduate Group. Other administrative assistance will continue to be provided by the SSHA Dean's Office. Assistance with Graduate Program assessment is provided by Angela Krueger, the UC Merced Substantive Change and Graduate Assessment Coordinator.

Section 7: Graduate Student Support

Our goal is to only admit graduate students who we have funds to support, including fees, stipend and health insurance. Our aim to provide five years of support for each graduate student accepted into the doctoral program, which is the typical package offered to incoming graduate students in peer universities.

To date, of the 6 Public Health graduate students, 2 have been self-funded (their choice), 1 has received a graduate fellowship from the Robert Wood Johnson Foundation, 2 have been funded through a combination of graduate research assistantships (funded by grants through the California Department of Public Health, the California Endowment, and from HSRI) and teaching assistantships, and 2 have been funded solely through teaching assistantships. At present, Public Health courses have been 5 and 7 TAs per semester, with the additional TAs being filled with Psychology graduate students.

Currently, the policy for funding a SSHA course is that they must have an enrolment of 80 or above. However, at the present time, the Provost has agreed to fund all graduate students enrolled in Ph.D. programs at UC Merced. As a result, all graduate students in good standing receive support from UC Merced.

Table 12. Projected undergraduate enrolments and TAs per semester

	2016/17		2017/18		2018/19		2019/20		2020/21	
	F	S	F	S	F	S	F	S	F	S
<i>Undergraduate courses</i>										
PH 01: Intro. to Public Health	80	80	120	120	160	160	160	160	160	160
PH 05: Global Public Health	80	80	120	120	160	160	160	160	160	160
PH 100: Epidemiology	160	160	200	200	200	200	200	200	200	200
PH 102: Health Beh. & Prom.	80	0	160	0	160	0	160	0	160	0
PH 103 Health Communication	0	80	0	160	0	160	0	160	0	160
PH 108: Intro to Health Care	80	0	80	0	120	0	120	0	120	0
PH 105: Intro to US Healthcare	0	160	0	200	0	200	0	200	0	200
PH 110: Environmental Health	80	0	80	0	80	0	80	0	80	0
PH 111 Social Epidemiology	0	120	0	0	0	160	0	0	0	160
PH 112 Health Ser. Res.	0	0	0	160	0	0	0	160	0	0
PH 113: Latino & Imm. Health	0	0	0	80	0	0	0	80	0	0
PH 115 GIS Mapping	0	0	25	0	0	0	25	0	0	0
PH 135 Public Health Genetics	0	0	0	80	0	0	80	0	0	0
PH 137: Insects & Public Health	80	0	0	0	80	0	0	0	80	0
PH 181: Public Health Research	0	50	0	50	0	50	0	50	0	50
PH 185: Health and Bioethics	0	0	35	0	0	0	35	0	0	0
<i>Number of students (summed across all classes)</i>	640	730	820	1170	960	1090	1020	1170	960	1090
<i>Number fulltime students (No. of students/7 courses)</i>	91	104	117	167	137	156	146	167	137	156
<i>Number of TAs per 80 students (No. of students/80)</i>	8	9	10	15	12	14	13	15	12	14
<i>Number of TAs per 40 students (No. of students/40)</i>	16	18	21	29	24	27	26	29	24	27

Under the conservative assumption that this policy of providing all graduate students in good standing with TA positions does not continue, then number of teaching assistantships that will be available in the future depends on two factors: Course enrolments and the available funding from the Graduate Division and the Dean of SSHA. As described above, although Public Health is a new undergraduate major, its rapid rise to one of the most popular minors on campus suggests that demand for the major will be strong. In addition, several of the introductory courses are general education courses, meaning that they can also expect higher enrolments. Using the projected growth in undergraduate majors shown in Table 1 (from 80 in 2016/17 to 180 in 2019/20) and the projected course offerings at the undergraduate level (Table 9), we can expect approximate 600 students in Public Health classes in the Fall of 2016 (Table 12), rising to over 1000 by the Spring of 2020. While these numbers are only approximate and dependent upon student

demand, they are reasonable assumptions given the enrolment patterns in our courses prior to the introduction of the major and during the first semester of the major being offered.

The number of TAships that are available will depend upon the level of available funding from the Graduate Division and the Dean of SSHA. As shown in Table 12 (Projected number of TAs per 80 students (No. of students/80), under the conservative assumption that there are no increases in the number of ladder ranked faculty or course offerings, the number of TAships that would available will vary from 8 in the Fall of 2016 to 14 or 15 by 2020. With our projected enrolments of 26 students by 2020 (Table 1), this would mean that faculty would have to find grant funding for 10 or 11 students. Alternatively, if the funding ratio was lowered to a TA per 40 students, then the number of TAships would range from 16 to 27, sufficient to cover our projected enrolments.

A major issue in funding graduate students throughout the UC system is non-resident tuition fees. These fees are substantial (over \$10,000 more than resident fees), and are applied to all non-California US citizens in their first year of graduate school and all non-US citizens for all pre-candidacy years of graduate school. Most Public Health students are likely to be US citizens. However, there may be exceptions and we anticipate admitting increasing numbers of non-California students in the future. We expect to draw on Graduate Division awards of Non-Resident Tuition fellowships for these students. University of California policy allows a waiver of Non-Resident Tuition for two years following advancement to candidacy for international students. The proposed program structure ensures that students will finish their Ph.D. within this timeframe.

Section 8: Governance

The Public Health Graduate Group will administer the Public Health Ph.D. program. The proposed graduate bylaws are included in Appendix B.

Section 9: Changes in Senate Regulation

This proposal requires no changes in Senate Regulations at the Divisional level or in the Academic Assembly.

Appendices

Appendix A:	Faculty Curriculum Vitae
Appendix B:	Public Health Graduate Group Bylaws
Appendix C:	Letters of Support
Appendix D:	Public Health Graduate Courses
Appendix E1:	Public Health Graduate Course Sample Syllabi
Appendix E2:	Public Health Dissertation Syllabus
Appendix E3:	Second Year Thesis Rubric
Appendix E4:	Public Health Qualifying Examination Rubric
Appendix E5:	Public Health Dissertation Rubrics
Appendix E6:	Student Progress Report Form
Appendix F :	CPEC Information

Appendix A Faculty Curriculum Vitae

SEE ATTACHED

Appendix B: Public Health Graduate Group Bylaws

Ph.D. in Public Health Bylaws

Administrative Home: Psychological Sciences

Revision date(s): December 10, 2014

Graduate Council Approved: pending

Article I. Objective

- A. Degree(s) offered by the program: Ph.D., M.S, in Public Health

- B. Discipline: Public Health is a multidisciplinary area of research and study that focuses on measuring, understanding and improving the health of the population, including assessing the health needs of vulnerable populations, understanding the causes and determinants of health challenges and problems, and identifying ways to improve the public health system and the health of the population. Public Health study focuses on five core areas - epidemiology, statistics/biostatistics, health services research, social and behavioral health, and environmental Health. The principal area of our Public Health program is Prevention and Population Sciences, an area that includes research that addresses health issues facing vulnerable populations such as chronic and infectious diseases. Other areas may be added by vote of the Public Health Graduate Group (hereafter referred to as the Group), in which case Article I should be amended accordingly.

- C. Mission of the Programs: The mission of the Group is to provide students with the experience and training they will need to eliminate health disparities and improve the health of vulnerable populations. Our goals are to (i) attract high-quality graduate students who are interested in conducting research relevant to underserved and vulnerable populations, (ii) provide world- class training in research aimed at preventing chronic/infectious diseases, promoting healthy development in underserved and diverse populations, (iii) provide training in multidisciplinary research and in translating and disseminating the research to diverse groups, including community members and organizations, healthcare providers, and policy makers, and (iv) successfully place graduates in tenure-track jobs in academia, or research positions in industry, government, or non-governmental organizations, in conformity with the policies and procedures of the Graduate and Research Council and the Graduate Division of the Merced campus of the University of California.

Article II. Membership

- A. Criteria
Membership is independent and separate from academic program appointments. Members must be Academic Senate Faculty or hold an appropriate academic title (including affiliated members from other UC campuses and adjunct faculty from other institutions). Because Public Health is a multidisciplinary course of study, membership is open to all UC Merced ladder faculty and

faculty members from other universities who meet all of the following criteria:

- (1) Hold an appropriate University of California academic title as (a) a member of the Academic Senate of the University of California, (b) Adjunct Professor, (c) Professional Research Series, or (d) Cooperative Extension Specialist; or hold an equivalent title outside the University of California system.
- (2) Have an active program of research or scholarship in Public Health or a related area commensurate with the expectations of the University of California.
- (3) Be approved by a majority vote of the Group.

B. Types

All members of the Group are Core Members; there are no Affiliate Members. Core Members of the Group faculty will contribute to the training and mentorship of graduate students in the Graduate Program. They will serve as graduate student advisors and members of Faculty Advisory Committees, participate in the planning and development of graduate courses and other facets of the graduate program, contribute to the assessment of the program's learning outcomes, and attend graduate program meetings.

Any existing Group member can nominate a faculty member for consideration as a new member of the Group. The vote will be open but can be converted to secret ballot vote upon any Group member's request. Upon obtaining a majority vote in favor, the Graduate Group Chair will extend an invitation to the candidate to become a member of the Graduate Group. The membership will be reviewed at the first meeting of the academic year and voted on by the Group members. Group members are expected to

- (i) contribute to the program's strategic development,
- (ii) participate fully in Graduate Group meetings, and
- (iii) be the (a) primary supervisor for at least one Public Health graduate student or (b) the secondary supervisor for at least two Public Health graduate students if deemed appropriate to their research expertise.

Requirement i and ii may be waived for individuals who are on sabbatical or university approved leave. Requirement iii may be waived for individuals whose appointments do not allow for student mentorship or whose research interests do not match current student interests.

Materials will be evaluated by the Graduate Group Chair for the appropriateness of the appointment to the Group. At the Chair's discretion, an ad hoc committee may be appointed to solicit input from the Graduate Group and provide a recommendation. Applicants will be admitted to the group if their applications receive a majority vote of the Group Faculty.

C. Voting Rights

All voting privileges pertaining to the Group are restricted to Group members.

D. Review of Membership

Continued membership in the Group will be based on active participation in the program, to be judged based on the following kinds of activities:

(1) An active public health research program indicated by significant publication in the principal peer-reviewed journals of the field during the past three years.

(2) A significant contribution to graduate mentorship and training by either advising a student participating in the faculty member's research program or by formal graduate teaching through research seminars and courses.

(3) General contribution to graduate research training through (i) participation in the management of the Group on one of its standing committees, or (ii) through service on the Graduate and Research Council as a representative of the Group, or (iii) through participation in or service on student or other school or university committees as a representative of the Group.

Faculty will remain as a member of the Graduate Group as long as he or she has passed his or her most recent regular personnel review process at UC Merced with the outcome being awarded a merit advancement or, in its place, a promotion in the past three years. By vote of the Group, a faculty member may be removed from membership in the Group by virtue of failing to meet the criteria for continued membership in the Group. Members may also be removed by two-thirds vote of the Graduate Group faculty. A motion for such a removal must be proposed by a Group faculty member in writing at least two weeks prior to the vote; and the member being proposed for removal must have the opportunity to respond in writing but must do so in the two week time period before that vote.

E. Membership Appeal Process

Anyone who is denied membership, or who is removed from membership, and wishes to appeal the decision may submit an appeal in writing and/or attend a meeting of the Group Faculty to discuss the decision. If those procedures do not result in a satisfactory outcome, the person may appeal to the Dean of the Graduate Division. Applicants denied membership or renewal of membership may make a final appeal to the Dean of Graduate Division.

Article III. Administration

The Dean (referred to as Lead Dean) providing oversight and resources for the Group will be elected by a simple majority vote of the Graduate Group members. This appointment must be renewed by vote every five years or less. [By unanimous vote the Dean, School of Social Science, Humanities and Arts was named Public Health Graduate Group Academic Dean starting July 1, 2009]. The Group will elect a Graduate Studies Committee Chair.

Article IV. Graduate Group Chair

A. Nomination Process

A member of the Group who holds an Associate or Full Professorship at UC Merced (or equivalent standing) will be nominated for Chair by the Faculty and recommended to the Dean of the Graduate Division, who makes the appointment. Group Faculty may nominate themselves as Chair or be nominated by other Group Faculty. Election of Graduate Group Chair-nominee shall be by majority vote. If more than two candidates have been nominated to this position, the two candidates having received the most votes in a preliminary voting round will be voted on in a final round, such that a simple majority determines who will be nominated. That nomination is then forwarded to the Dean of the Graduate Division.

The election of the Graduate Group Chair-nominee is repeated at the start of every academic year, resulting in either a re-nomination of the same faculty member or nomination of a new faculty member for Graduate Group Chair. In practice, the same person is typically re-nominated if he or she has been doing a satisfactory job, because there is a steep learning curve for anyone who is appointed as Graduate Group Chair.

B. Duties of the Chair:

- Oversee the progress of graduate students through the program, including satisfaction of degree requirements and advancement to candidacy, in coordination with group advisors, faculty and staff;
- Represent the group faculty in all matters related to the degree program(s) to the lead dean, the graduate dean, Graduate Council, and School Executive Committee(s);
- Determine resource needs and administer program budget, in consultation with group faculty, lead dean, and graduate dean;
- Oversee graduate student recruitment, graduate program website, admissions, and financial aid, in consultation with group faculty, lead dean, and graduate dean;
- Determine graduate course offerings each semester, including curriculum changes, in consultation with group faculty, and school staff and faculty involved in course scheduling and teaching assignments;
- Determine graduate course resource needs for equipment, staff support, and other resources, in consultation with faculty and lead deans;
- Serve as graduate group Faculty Accreditation Organizer by overseeing annual program assessments and periodic program review, to monitor and maintain academic excellence;

- Consult with deans in selecting and reviewing graduate support staff;
- Coordinate participation of the graduate group in School and University program activities, including graduate student fellowship and award programs;
- Develop and maintain a plan for promoting diversity among matriculated graduate students;
- Manage and respond to program feedback and inquiries from faculty, students, staff, and reviewers;
- Approving committees that review a graduate student's completion of formal requirements, including committees examining a graduate student's Pre-Candidacy Project, Qualifying Exam, and Dissertation;
- Preparing recommendations for Teaching Assistant employment and class assignments;
- Monitoring that each student in the Graduate Group meets all academic requirements and maintaining records of such for each student. Included in this responsibility is chairing the yearly review of progress for all graduate students at the end of the spring semester. Note that the ongoing advising for and monitoring of a graduate student's progress is the responsibility of that student's Faculty Advisor.

C. Vice Chair

The Public Health Graduate Program will have a Vice Chair. The duties of the Vice Chair are i) to support the Chair, ii) preside over the Group meetings in the Chair's absence, and iii) along with the Chair, act as the administrative liaison between the Group and the relevant academic Dean, the Graduate Council, the Division of Graduate Studies, and other campus units. The election of the Vice Chair-nominee is repeated at the start of every academic year, resulting in either a re-nomination of the same faculty member or nomination of a new faculty member.

Article V. Committees

1. Executive Committee

The administration of the Graduate Group and its activities will be vested in the Graduate Group Executive Committee (GGEC) consisting of the three elected members (a member plus the Group Chair and Vice-Chair). The GGEC will be chaired by the Graduate Group Chair, who holds regular voting privileges. It is the responsibility of the Graduate Group Chair to voice the results of GGEC deliberations to pertinent academic and research administrative units, the Dean of the Graduate Division, and to the Lead Dean. The GGEC may choose to not constitute a particular committee described below as a separate body, in which case the GGEC will assume the responsibilities of that committee. Committee formation and appointments will be reviewed on an annual basis.

A special duty involving the GGEC will be to hear student grievances. When hearing student grievances the GGEC will add one tenured UC Merced faculty member not associated with the Group to participate in the process and all votes pertaining to the grievance. This is to enhance the impartiality of a process when grievances are filed about a colleague of members of the GGEC.

The Graduate Group Chair will propose five such external candidates and the student filing the grievance may choose to remove up to two candidates from further consideration. A GGEC member who is a member of a committee against which a student is filing a grievance will recuse himself or herself from the review process, but may be interviewed by the remaining committee members as part of the information gathering process.

Students have the right to pursue grievances with the GGEC, which will assemble, review pertinent information, and provide a written summary to the Graduate Group Chair within 30 calendar days of the student grievance. Extensions may be granted in writing by the Graduate Group Chair when warranted by key parties on either side of the grievance (e.g., extended travel obligations, illness). The GGEC will rule on the case. Students have the right to appeal this ruling to the Dean of the Graduate Division within 30 calendar days. The Dean of the Graduate Division may request that the Lead Dean and/or other appropriate parties investigate the student's concerns or grievances and determine appropriate resolutions. Ultimately, the final resolution of all disputes lies with the Dean of the Graduate Division as described in UC Merced's Graduate Advisors Handbook. In the event that the dispute involves the Dean of the Graduate Division in her/his role as a faculty member, then the final resolution of all disputes resides with the Executive Vice Chancellor.

2. Graduate Curriculum and Education Policy Committee

The Graduate Curriculum and Education Policy Committee shall consist of the three elected members of the GGEC and a student representative selected by the Public Health graduate student organization. Elected members of the GGEC may choose to delegate this responsibility to another faculty member, subject to approval of the GGEC. One of these Committee members is chosen by the members of the Committee to be the Graduate Curriculum Committee Chair for a one year term at a time.

The function of the Graduate Curriculum and Education Policy Committee will be to take whatever action is necessary to act on behalf of the Group during the year to define and implement the program leading to the Ph.D. degree. The Committee is charged with establishing and maintaining documentation on the Public Health Graduate Group curriculum, and the Committee will periodically prepare for system reviews of the Public Health Graduate Group, including the seven-year review.

The Committee, in consultation with the Group Faculty, will coordinate and document proposed changes in programmatic requirements of the Group program, and present proposed changes to the voting body, and the Graduate and Research Council if required. All changes to the programmatic requirements of the Group curriculum and associate requirements must be approved by vote of the eligible Group Faculty.

3. Admissions/Fellowships Committee

The Admissions/Fellowships Committee shall consist of consist of the three elected members of the

GGEC. Elected members may choose to delegate this responsibility to another faculty member, subject to approval of the GGEC. One of these Committee members is chosen by the members of the Committee to be the Graduate Admissions/Fellowship Committee Chair for a one year term at a time, so that someone is responsible for the timely review of graduate applications.

This committee is charged with the development of recruiting materials for the Graduate Group, reviewing recommendations for admissions, making recommendations for admissions to the Dean of the Graduate Division, and exploring graduate student support mechanisms.

Recommendations for graduate student admissions originate within each Group Faculty member. Such recommendations shall be made by the faculty member to the Graduate Admissions/Fellowship Committee. These recommendations will be reviewed by GGEC and rankings proposed for acceptance must be made by majority vote of Group faculty.

The Admissions/ Fellowships Committee also recommends the allocation of intramural financial assistance to the GGEC, who makes the final decisions or recommendations to an awarding body as appropriate. Recommendations for new and continuing student fellowships are also made to the Admissions/Fellowship Committee by faculty. The Admissions/Fellowship Committee forwards its recommendation the GGEC, who makes the final decisions.

Article VI. Student Representation

A student representative will be included in all deliberations that revolve around issues having to do with educational policy and curriculum. Students do not have voting privileges. The student representative will be elected by the current graduate students enrolled in the Public Health Graduate Group and appointed by the Graduate Group Chair. The student representative will serve a one-year term and may be re-elected for no more than one additional term.

The Chair of any committee with student members must excuse the student representatives from meetings during discussion about other students, applicants, personnel actions or disciplinary issues relating to faculty, during rankings of existing students for funding, for disciplinary issues related to students, and other executive session discussions at the discretion of a committee Chair.

Article VII. Faculty Advisors

A Faculty Advisor, who must be a member of the Group, will be recommended for appointment by the Graduate Group Chair in compliance with policies and procedures of the Graduate Division. The Faculty Advisor serves as the student's primary mentor, supervises most of his or her research progress, and normally serves as the Chair of the student's Faculty Advisory Committee. The Faculty Advisory Committee, in regular meetings and through individual contact, keeps track of the progress of the student and provides advice on how the student may best complete the requirements of the Program. Students work in consultation with the Faculty Advisor to create the Graduate Advisory Committee. The Faculty Advisor must approve the Graduate Advisory Committee, including any changes to

membership due to situations such as a faculty member leaving the University or a change in the student's direction of work. The Faculty Advisor also approves the Candidacy Committee and the Dissertation Committee. The Faculty Advisor, in the role of a mentor, plans strategies that will support the development of required competencies and provides ongoing, informal feedback regarding the student's progress. In addition, the Faculty Advisor conducts a formal evaluation of the student's progress in the program at least semi-annually.

Article VIII. Meetings

A. Notification of Meetings

The Graduate Program annual meeting will be held in at the end of the Spring semester. The Graduate Group Chair will call the meetings through email notifications. Notice of meetings must be distributed to all Graduate Group Faculty in residence at least three days prior to the meeting, and agenda items must be solicited. Group Faculty may choose to waive the three-day requirement by unanimous vote. Any faculty member can petition for additional meetings by submitting a request by email or in writing to the Group Chair. Faculty members are strongly encouraged to attend the annual meeting in person. If faculty are unable to participate in person, they are permitted to participate by tele/video conference. Minutes of meetings shall be distributed within ten days of the date of the meeting.

B. Order of Business for Meetings

N/A

Article IX. Quorum

Issues that require a vote of the Group Faculty need to have a 50% quorum present. Revisions to the Graduate Group Bylaws will require a 2/3 vote in favor; all other Group decisions will be determined by simple majority of those voting. Voting procedures shall follow the approved voting procedures of the Psychological Sciences Bylaw 55 unit.

Article X. Amendments

Amendments to the By-Laws require approval by two-thirds of the eligible voting members of the Group. Written notice of the proposed amendment shall be sent to each member at least three days prior to the meeting at which the amendment is to be discussed. Group Faculty may choose to wave the three-day requirement by unanimous vote. Voting procedures shall follow the approved voting procedures of the Psychological Sciences Bylaw 55 unit. All amendments must be submitted to Graduate and Research Council for review and final approval.

Appendix C: Letters of Support

C1. Letter From Jim Dooley re Library Acquisitions

To: Paul Brown

From: Jim Dooley

Re: Additional costs for health programs at UC Merced

Date: 4 August 2014

I have reviewed a list of journal holdings provided by the public health library at UC Berkeley and estimate that the annual subscription cost for access to journals in support of public health and health psychology to which we do not already have access to be approximately \$30,000 per year.

In addition, a subscription to the Journal of the American Medical Association (JAMA) will cost UC Merced \$3,300 per year and a subscription to the New England Journal of Medicine (NEJM) will cost an additional \$1,000 per year.

UC Merced has been provided gratis access to Mary Ann Liebert journals since the campus opened. The establishment of programs in health may well trigger a request that we pay our share to continue access to this package which could be as much as \$5,000 per year.

The acquisition of e-books and reference works from health-related societies and commercial publishers can be expected to cost at least \$5,000 per year.

According to feedback from faculty, currently available information resources in molecular and cell biology are adequate to support the growth of health programs.

Therefore, I estimate that the library will need a minimum of \$40,000 and possibly \$45,000 per year in initial additional funding to adequately support the information resources needs of health programs at UC Merced. This amount may be expected to increase in response to inflation and growth of the programs.

C2. Letter of Support from Dean Aldenderfer

September 5, 2014

TO: Kathleen Hull, Chair, Graduate Council

FROM: Mark Aldenderfer, Dean, SSHA

RE: Memorandum of support for the Public Health graduate studies proposal

I take pleasure in writing this memo in regard to the Public Health graduate studies proposal submitted to my attention. I have reviewed the document carefully, and offer my support to it.

My role as dean for this proposal review focuses primarily upon an analysis regarding the allocation of resources to assure the growth and viability of the program. For its successful development, the Public Health graduate program has requested support for new FTE. As documented in the proposal, existing laboratory and research space is sufficient for projected needs assuming each new faculty member receives a standard office. This will be no issue given the projected opening of COB 2 in 2016. It may be the case, however, that specific new hires will require more specialized space. In this instance, the Public Health program will negotiate with the dean regarding this requirement. As is well known, the campus now faces a serious shortage of spaces of all kinds, and while I as dean will do my utmost to accommodate any additional space needs of the Public Health program, the only true guarantee of this will be the success of the 2020 project. The Public Health program will require additional library resources, but this request is not one SSHA can satisfy as it lies beyond our remit. The dean's office will continue to support the graduate programs within the School. I anticipate that as new programs are proposed and come on line over the next six years, additional staff FTE will be hired to support these programs. Where these staff will sit (programs or dean's office) remains to be determined. However, I know that additional FTE will be required, and I plan to work aggressively to obtain them in my future strategic plans. We have had internal discussions about these plans within the School, and within the framework of the Strategic Workforce Initiative.

FTE requirements, present and future: As noted in the proposal, to launch the program, the number of current core Public Health faculty FTE (seven) is seen as sufficient. I concur. It is comparable in size to recently launched Ph.D. programs at UCM, including Sociology (nine) and Political Science (ten) and the proposed Economics graduate program (eight). Given this solid foundation, I see their long-term goal of having 12 FTE in the program by 2020 as reasonable and achievable. Given the growth of student interest in the program and potential synergies with a number of existing programs on campus, the need for additional FTE is clear. These new hires, will, of course, teach at the graduate level as well. Of special importance to the success of the

Public Health program is its clear synergy with other programs on campus, notably Psychological Sciences in SSHA and others in the School of Natural Sciences. All teaching requirements for the Public Health program can be met by these interdisciplinary connections and the planned growth in FTE of the program. However, it must be noted that there continues to be uncertainty regarding the process by which FTE will be allocated to programs in the near term. The Strategic Focusing Initiative will be launched in earnest in this academic year, and the Public Health program is well poised to compete in this arena given the emphasis UCM has placed on health-related programs. As noted in the proposal I have consistently sought to support growth in faculty numbers in my strategic planning for the School, and given the growth of the undergraduate program in Public Health and the potential for creating a unique graduate program, I will continue to advocate for Public Health in future planning efforts.

Appendix D: Public Health Graduate Courses

PH 201: Foundations of Public Health (4 units)

This course presents the theories and practice of Public Health research and its role in preventing chronic and infectious diseases. The course will highlight the responsibilities of public health researchers and practitioners, the role that Public Health research and practice play in improving the health of the population, and social context of health and health disparities in the US. The course provides an introduction to transdisciplinary approaches to the theory and practice of Prevention Science, including preventing maladaptive behaviors and promoting healthy lifestyles as it influences both chronic and infectious disease, with a particular focus on the chronic and infectious diseases facing the people in rural, underserved, and ethnically diverse regions.

PH 202: Epidemiology (4 units)

This course will introduce advanced principals and methods of epidemiology with the goal of teaching students to understand the distribution and determinants of disease in human populations. The course will also expose students to the epidemiology of diseases and conditions of current public health importance in the United States and internationally.

PH 203: Research Methods (4 units)

This course provides advanced training in mixed methods research for Public Health. Topics covered include identifying research questions that require contextual understandings, multi-level perspectives, and cultural influences, best practice toward employing quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs, best practice for the use of case studies and qualitative methods, how best to integrate methods to draw on the strengths of each, and ways to frame the investigation within philosophical and theoretical positions.

PH 204: Environmental Health (4 units)

This course introduces students to the principles, theories and methods of Environmental Public Health. The focus is on the interaction between people and the environment, including how to recognize, assess and control the impacts of the environment on people and how best to gauge the impacts of the environment on the health. This course presents a broad survey of the major environmental health issues, with particular attention paid to the impact of the environment on the vulnerable groups.

PH 205: Health Services Research and Policy (4 units)

The purpose of this course is to provide an advanced training in the theoretic foundations, tools, and techniques used by researchers to examine health services. We will focus on four topics: quality of care, access to services, and cost/expenditure on health services, and translation/dissemination of research. Our discussions and readings will cover analysis of routinely collected data, interpretation and presentation of results to stakeholders and implications for changing practice. Particular attention will be paid to the state

of the health services rural, underserved areas, and the effectiveness of various interventions designed to improve the effectiveness of these services.

PH 206: Health Communication (4 units)

This graduate seminar is designed to provide students with a critical understanding of the effects of mass media in promoting and impeding the achievement of public health goals. The course covers the design, implementation, and evaluation of mass media campaigns to promote public health goals, including theories and research on message design, audience analysis, and media influences on health. Students will develop the skills to use mass media strategically to advance public health policies and social change.

PH 207: Social and Behavioral Theory in Public Health (4 units)

This course will provide students with an understanding of the social, cultural, and environmental determinants of health-related behaviors. The course is divided into 2 sections: 1) Individual, Social, Cultural and Environmental Theories and 2) Community and Organizational Theories, Structural Change, and Policies. Students will gain an understanding of the importance of using theories and models to understand health behavior, conduct research, and change behaviors to reduce injury and disease.

PH 208a: Professionalization seminar (2 units)

This course is designed to acquaint early-stage graduate students in the core professional knowledge and skills central to the discipline and practice of Public Health, as well as the research areas of focus by faculty in Public Health, how Public Health is practiced by practitioners in the community, and the ways in which Public Health researchers can facilitate the translation of research to the community organizations, governmental bodies, and the wider public. The focus of this course is to expose students to the range of public health research and practice, especially as it relates to the prevention of disease in rural, underserved communities.

PH 208b: Professionalization seminar (2 units)

This course is designed to acquaint early-stage graduate students in the core professional knowledge and skills central to the discipline and practice of Public Health, as well as the research areas of focus by faculty in Public Health, how Public Health is practiced by practitioners in the community, and the ways in which Public Health researchers can facilitate the translation of research to the community organizations, governmental bodies, and the wider public. The focus of this course is to provide students with examples of transdisciplinary public health research and how research is disseminated to communities, healthcare providers, and policy makers.

PH 221: Social Epidemiology and Health Disparities (4 units)

The course explores how social forces affect human health and wellbeing by focusing on how interactions between social interactions, human activities, social conditions, social problems, and other social arrangements affect the health of the population. Particular attention is paid to differential health outcomes and the pathways through which social factors affect health for vulnerable populations.

PH 222: Program Design and Evaluation (4 units)

The course provides students with the theoretic basis for conducting different types of program evaluations, including needs assessment, formative research, process evaluation, monitoring of outputs and outcomes, impact assessment, and cost analysis. The focus will be on public health programs in the San Joaquin Valley designed to improve the health status of vulnerable populations. The course will require students to design and present research and evaluations for a program in the region.

PH 233: Qualitative Research Methods for Public Health (4 units)

The course reviews the types of qualitative research methods relevant to population health, emphasizing assumptions underlying various approaches. Course focuses on design, entree, ethics, data-gathering techniques (interviewing, observing), data recording and management. The course provides an introduction to data analysis, including issues in establishing plausibility, credibility, and adequacy. Particular emphasis is given to the utility of qualitative methods in the study of health issues in underrepresented and hard to reach groups.

PH 224: Environmental Epidemiology (4 units)

The course examines the epidemiological methods for designing, conducting and interpreting epidemiological studies of people that have been exposed to environmental agents (chemical and physical). The course provides students with training in methods to identify the attributable contribution to disease from environmental sources of exposure such as water contamination, air pollution, and climate change. The course will use existing datasets to illustrate the etiological linkages between environmental exposures and health status in particular populations, and how best to estimate the attributable burden of disease. Students will be required to produce a health impact assessment aimed at informing communities, healthcare providers, and/or policy makers on the environmental burden of disease.

PH 227: Advanced Public Health Research Analysis (4 units)

This course covers advanced topics in the analytic methods of public health research. The course content includes instrumental variable analysis, propensity score analysis, discrete choice analysis, and structural equation modeling.

PH 235: Pesticides, Health, Environment (4 units)

Course topics include the impact of pesticides on human health, toxicology, and symptoms of exposure to these products. Insecticides will be surveyed, along with their history and the development of biologically based products. Environmental health will be examined through investigating the impacts of pest control on air and water quality, and related to regional health issues and health disparities. Prevention of illness will be covered by review of safe work practices and existing policies. Additional topics include pesticide residues and food safety, organic agriculture, integrated pest management in schools, and alternatives to pesticides.

PH 236: Vector Ecology (4 units)

This course will survey insect and arthropod vectors which transmit diseases including Dengue fever, Chagas disease, Lyme disease, Malaria, and several others. The geographic distribution, abundance, and ecology of vectors will be examined. Recognizing disease symptoms and research for treatments of these conditions will be discussed. Ecological factors such as habitat alteration, urbanization, climate change and globalization which impact vectors will be explored. Additional topics include management and integrated pest management programs for these insects and arthropods.

PH 241: Public Health Genetics (4 units)

This course introduces graduate students in public health to the biology and societal implications of genes, inheritance, and health. The molecular underpinnings of trait inheritance and variation and their role in shaping health are surveyed, along with the basis of heritable similarities and differences between groups and populations. The societal role of genetics is also explored, via discussions of public perceptions of genetics, ethical dilemmas, and legal issues. Current resources available to professionals addressing these issues, and their prospective role as genetics gains momentum in the health arena, are covered to demonstrate practical opportunities for implementing gene-based approaches in public health.

PH 299: Public Health PH.D. Dissertation Research (2 to 12 units)

Research and writing of a PH.D. dissertation in Public Health.

ES 234: Air Pollution and Resources (3 units)

Chemistry and physics of atmospheric pollutants, urban air pollution, visibility, mitigation, and resource economics.

PSY 202C: Multivariate Analysis (4 units)

Introduction to analysis of data having multiple dependent variables. Topics include continuous multivariate distributions, multiple regression, multivariate analysis of variance, discriminant analysis, classification, canonical correlation, principal component analysis. Applications from clinical, cognitive, physiological, and social psychology. Computer methods.

PSY 206: Quantitative Methods for Reviewing Research (4 units)

Quantitative procedures (meta-analysis) for reviewing research findings; techniques for locating and coding research studies, calculating effect sizes, and analyzing study findings.

PSY 208A: Methods for Program Evaluation (4 units)

Introduction to program evaluation. Survey of the many methods used in program evaluation, including needs assessment, surveys, experiments, and qualitative methods. Discussion of policy and strategy issues, and of utilization of findings.

PSY 208B: Theory of Program Evaluation (4 units)

History and nature of program evaluation, review of different approaches taken to evaluation by variety of major theorists in the field; practice in evaluation.

PSY 220: Health Psychology (4 units)

A review of theory and research on how behavior affects health and disease as well as how disease affects behavior (e.g., cognitions, emotions, relationships) in humans. Research into behavioral interventions to improve, ameliorate, or prevent disease are also reviewed. Focus is placed on the role of behavior for the major diseases and threats to health in children, adolescents, and adults.

PSY 221: Issues in Health Psychology (4 units)

A survey of selected topics in health psychology not covered in PSY 220. This may include psychological perspectives on major chronic disease, quality of life in people with health conditions, pediatric psychology, aging and health, and the interface between public health and health psychology.

PSY 224: Health Disparities (4 units)

Disease prevalence, severity, and treatment varies across sociodemographic groups. Understanding why health disparities occur is key to determining how inequalities might be alleviated. The focus of this course is on research that a) describes health disparities, b) investigates factors that explain differences, and c) proposes interventions to treat at-risk populations.

PSY 225: Health Risk Decision Making (4 units)

A focus on the decision making process underlying health risk behaviors. Consideration of the role perceptions of risks/benefits, attitudes, emotions, social relationships, and the media play on health decisions, with an emphasis on decision making theories (e.g., rational choice theory, prospect theory, health beliefs model, and the theory of planned behavior).

PSY 230: Developmental Psychology (4 units)

The stages that children go through as they develop. Covers cognitive development, biological development, social development, personality development, emotional development, among others. Focus is on integrating across these different content areas.

PSY 280: Human Behavioral Genetics (4 units)

Explores the genetics of individual and group differences for a variety of traits (e.g., personality, health, learning, abnormal development, etc.). The necessary background in genetics and statistics will be provided through lecture and readings. Methodologies and their critical evaluation will be emphasized.

SOC 210: Graduate Statistics 1: Linear Regression Analysis (4 units)

Provides an introduction to statistics for graduate students. We will address the basics involved in manipulating and analyzing data, focusing on ordinary least squares (OLS) regression analysis. We will also discuss the assumptions behind the method, as well as interpretation of findings.

SOC 211: Graduate Statistics 2: Categorical Regression Analysis (4 units)

The second in a two course sequence in applied statistics. This course will cover categorical data analysis: regression models in which the dependent variable is categorical: binary, nominal, ordinal, and count.

SOC 230: Stratification (4 units)

This class will explore classical as well as recent theoretical and empirical developments in social stratification and inequality. Course topics will range from neoclassical economics, and human capital theory to more sociological approaches that emphasize the importance of social relationships and the structure of organizations and institutions.

SOC 245: Sociology of Health (4 units)

This course will critically examine how health and illness are defined and socially constructed, the medicalization of society, and the social control of medical practice. We will explore how disease and inequality are intimately linked, particularly how health varies by class, gender, and race.

Appendix E1: Public Health Graduate Course Sample Syllabi

Epidemiology (PH 202) Spring 2016 Syllabus

Course Information

Number: PH 202
Term: Spring 2016
4 Units

Instructor Information

Sidra Goldman-Mellor, Ph.D.
sgoldman-mellor@ucmerced.edu
Office hrs: Thursdays 12-2

Course Description

This course is designed to introduce, compare, and apply conceptual frameworks, measures, study designs, and analysis approaches used in the field of epidemiology. Topics include causality, measures of disease, measures of association, study design (trials, cohort, case-control, cross-sectional and ecological), biases, screening, statistical inference, and analyzing epidemiologic data. Public health topics of relevance to the San Joaquin Valley will be drawn on for many of the course's examples. We will emphasize applications to public health practice for students intending to engage in, collaborate in, or interpret the results of epidemiologic studies in the scientific appraisal of community health.

Course Learning Objectives

At the end of this course, students will be able to:

1. Describe a public health problem in terms of magnitude, person, place and time.
2. Calculate core epidemiology measures, understand the major study designs, and apply the basic terminology and definitions of epidemiology.
3. Explain the major conceptual models of causality in epidemiology, and identify issues in epidemiologic study design and analysis that threaten causal interpretations of epidemiologic data.
4. Use appropriate statistical methods, including multivariate models, to analyze data from epidemiologic studies using cross-sectional, case-control, or cohort designs.

This course will help students achieve the following Public Health Track Learning Objectives:

- Breadth of knowledge in Public Health.
- Competency with contemporary social science methods used to conduct rigorous research on public health phenomena.
- The ability to initiate and conduct independent research that makes an original contribution to Public Health knowledge.
- Proficiency in the skills needed to participate in the intellectual and organizational aspects of the profession of Public Health.

Readings

Two textbooks are required for the course:

- Rothman, K.J., S. Greenland, and T.L. Lash. *Modern Epidemiology*. 3rd ed. 2012, Philadelphia, PA: Lippincott Williams & Wilkins.
- Szklo M, Nieto JF. *Epidemiology: Beyond the Basics*. 2nd ed. 2007, Sudbury, MA: Jones and Bartlett.

Other readings include selected chapters from other textbooks and journal articles. Any required readings that are not in the two required texts will be posted on the course website.

Problem sets

Problem sets will be posted on the course website for each topic covered in the course by 6pm on the Friday a week before their due date. Problem sets are “optional” in that they are not collected or graded. *However*, many examination questions will be similar to those in the problem sets and I strongly recommend that you complete all problem sets. Solutions to all of the problem sets will be posted on the website Thursday at 5pm the day before the discussion on that topic and the solutions will be reviewed as necessary at the end of that Friday’s class. Enrichment problem sets that involve use of statistical software (Stata) are also available for selected topics. These are provided purely for those who find them helpful. There is nothing uniquely covered in these statistical problem sets that will be on exams.

Exams

There are three in-class exams during the course. Exams will include material presented in both lecture and the required readings. The exams are cumulative (largely because the concepts covered in the class are cumulative) but will emphasize the material covered in the preceding third of the course. All three examinations are in-class and closed-book (no notes). You may bring a calculator but you may NOT bring a cellphone, calculator/PDA, or any type of SMS device. Exams are all graded blind – they are coded numerically and I will not know who completed each exam while we are grading, or at any time during the semester (unless you inform me – e.g., if requesting a mid-semester recommendation). Final grades are also assigned blinded.

Grades

Course grades are based on the three mid-term exams; the exams count for 1/3 each. Grades are assigned based on the overall performance of the class. Students earning points in the following percentage ranges (averaged across the three exams) will earn a grade at least as high as:

- A: 90-100%
- B: 80-90%
- C: 70-80%
- D: 60-70%
- F: <60%

Grades are required by the University and most of you will use them appropriately as a motivational tool. The focus of this course is on what you learn, not on your grade. Nobody (other than yourself) in three months or three years will or should care what your grade in an epidemiology course was; they will and should care about how well you are trained and what you have accomplished subsequent to the course using your epidemiology skills. Focus on maximizing your methodological training while you are here and the grading will not be an issue.

Academic Honesty

Students are expected to abide by the UC Merced campus-wide Academic Honesty Policy (see http://studentlife.ucmerced.edu/files/page/documents/academic_honesty_policy.pdf). Academic misconduct is a serious offense. Violation of these policies may result in a grade of “F” or 0 points for the assignment, or for more serious violations, a grade of “F” in the course, at the discretion of the instructor.

Special Needs

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss his or her specific needs. Also contact Disability Services at (209) 228-6996 or disabilityservices@ucmerced.edu as soon as possible to become registered and thereby ensure that such accommodations are implemented in a timely fashion.

Course Schedule

Date	Day	Topics
January 19	Tuesday	Introduction
January 21	Thursday	History of epidemiology
January 26	Tuesday	Causality
January 28	Thursday	Measures of disease
February 2	Tuesday	Measures of disease
February 4	Thursday	Measures of association
February 9	Tuesday	Measures of association
February 11	Thursday	Study design overview
February 16	Tuesday	Cohort studies
February 18	Thursday	Cohort studies
February 23	Tuesday	Review
February 25	Thursday	EXAM 1
March 1	Tuesday	Experimental trials; Case-control studies
March 3	Thursday	Case-control studies
March 8	Tuesday	Cross-sectional & ecological studies
March 10	Thursday	Information bias

Date	Day	Topics
March 15	Tuesday	Selection bias
March 17	Thursday	Confounding
March 22	Tuesday	<i>No class – Spring Break</i>
March 24	Thursday	<i>No class – Spring Break</i>
March 29	Tuesday	Effect modification
March 31	Thursday	Matching; Review
April 5	Tuesday	EXAM 2
April 7	Thursday	Screening
April 12	Tuesday	Statistical inference
April 14	Thursday	Sample size, power
April 19	Tuesday	Analyzing epidemiologic data
April 21	Thursday	Analyzing epidemiologic data
April 26	Tuesday	Meta-analysis/systematic reviews
April 28	Thursday	Meta-analysis/systematic reviews
May 3	Tuesday	Course wrap-up
May 5	Thursday	EXAM 3

Health Services Research and Policy

Coordinator: Paul Brown, Public Health
Email: pbrown3@ucmerced.edu
Office hours: Wed 1.00 – 3:00 and other times by appointment
Office: Social Sciences & Management (SSM) 363B
Class times: Friday 9 to 12
Classroom: SSM 100

Health services research has been defined as a “transdisciplinary field of scientific inquiry that studies how social factors, financing systems, organizational systems processes, health technologies and personal behaviors affect access to care, the quality and cost of health care, and, ultimately our health and well being.” But health services research differs from other areas of research in that there is a conscious effort made to ensure that the research translates into changing practice. That is, an explicit goal of health services research is to make the results pertinent to stakeholders, be they policy makers, clinicians or the public, so as to have a positive impact on the delivery of health services to the public.

The purpose of this course is to provide an introduction into foundations, tools and techniques used by researchers to examine health services. We will focus on four topics: quality of care, access to services, and cost/expenditure on health services, and translation/dissemination of research. Our discussions and readings will cover analysis of routinely collected data, interpretation and presentation of results to stakeholders and implications for changing practice.

Course Learning Goals:

This course aims to accomplish the following objectives:

1. familiarize students with the conduct and use of health services research,
2. give experience in analyzing and interpreting routinely collected data from health services,
3. discuss links between this research and the policy making environment,
4. foster critical thinking through discussion and analysis of some current policy issues in the US and internationally

Course Learning Outcomes:

At the end of this course, students will be able to demonstrate the following:

1. Define health services research as it relates to public health, and describe the roles and responsibilities of government, non-governmental organizations, and private citizens in health services research.
2. Use the theories and principles of health services research to define an issue relating to cost/expenditure, quality of care, or access to care.
3. Apply health services research methods to conduct rigorous research on health care issues.

4. Identify and analyze scientific data and other information to assess complex health care challenges.
5. Communicate effectively and persuasively, orally and in writing, particularly to convey complex concepts and information in a clear and concise manner.

Overview

Class will be a seminar style, with instruction designed to highlight the relevant issues being discussed. The typical class will involve the following format:

- 9:00 to 10:15 Presentation of materials
- 10:15 to 10:30 Break
- 10:30 to 12:00 Seminar discussion of relevant papers or demonstration of data analysis

Required Texts

There are no required texts. Readings will be assigned prior to class.

Graded Major Assignments

Paper: An 8-10 page integration and review of 3-5 empirical papers on a topic relevant to health services research. A draft paper will initially be due on 11/5 for a peer writing workshop held on 11/7. The final version incorporating feedback will be due on 12/12. More details are forthcoming. This will account for 50% of the final grade.

Presentation/Discussion: You will be responsible for leading a discussion on a topic relevant to your research. PowerPoint or similar is expected. More details are forthcoming. This will account for 50% of the final grade.

Class Attendance, Participation, and Assignments

You are expected to attend every class meeting in its entirety. If an absence is unavoidable, please contact the instructor as soon as possible. You are also expected to come to class prepared to participate in the discussion based on any assigned readings. Therefore you need to complete the assigned readings prior to class. Finally, you are expected to turn in assignments by due date *and time*. Problems in any of these areas will result in a reduction of otherwise earned grade.

Program Learning Outcomes

These goals and outcomes are congruent with Program Learning Outcomes stated for the Interdisciplinary Public Health minor and the guiding principles stated for UC Merced. The specific ways the course addresses these goals and principles are stated below.

- Scientific Literacy: Students will read and interpret theoretic and empirical studies from health services research on the organization and performance of the health care system;
- Decision Making: Students will understand the contribution of diverse factors on health care policy making;
- Communication: Students will convey the results of their research through class participation and class assignments;

- **Self and Society:** Students will understand the role of the health care system in improving the health and wellbeing of the population, the challenges societies face in delivering high quality health care, and the inequalities that can result;
- **Ethics and Responsibility:** Students will be exposed to the ethical issues associated with the trade-off being controlling the cost of health care, providing efficient health care services, and targeting services to reduce health inequalities;
- **Development of Personal Potential:** Students will apply the course material to developing ways to improve the delivery of health care services/reduce health inequalities.

Policy on Academic Integrity:

The University of California has outlined a general code of student conduct that can be viewed at <http://www.ucop.edu/ucophome/coordrev/ucpolicies/aos/uc100.html>. Also, go to http://admissions.ucmerced.edu/docs/ucm_policies.pdf for the UC Merced code of academic conduct. Chapter 8 outlines policies on academic honesty. All academic work is expected to be in compliance with this code.

In particular, any form of cheating is a serious offense. Cheating includes any attempt to defraud, deceive, or mislead the Professor or TA in arriving at an honest grade assessment. This certainly includes, but is not limited to, turning in an assignment that does not represent your work. Violation of these policies may result in a grade of “F” or 0 points for the assignment or exam, or for more serious violations, a grade of “F” in the course, at the discretion of the instructor.

Academic Assistance:

Professor Brown can help you understand the relevant course material and what is required of you in this course. Stop by during scheduled office hours to get help when you need it. However, if you need help more generally with your academic skills and approach to learning, please turn to the *Student Advising and Learning Center*, which has numerous resources that can be helpful to you (<http://learning.ucmerced.edu/student-advising-and-learning-center>).

Special Needs:

UCM provides individuals with disabilities reasonable accommodations to participate in educational programs, activities, and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements should contact the UCM Disability Services Center located in KL 109 (<http://disability.ucmerced.edu/>) to obtain assistance and coordination with this course. It is also helpful if you inform the Professor of your special needs, for example by stopping by during office hours or speaking with the TA.

Classroom Civility:

Each UCM student is expected to contribute to an environment during class that *promotes learning, dignity, and mutual respect for everyone*. Please consider how your behavior affects other students in the class as well as the Professor. In particular, students are expected to avoid at all times from:

- interrupting class by coming after instruction has started
- speaking at inappropriate times, which includes having conversations with others in class,
- engaging in loud or distracting behaviors,
- sleeping in class,
- taking frequent breaks,
- using cell phones or pagers in class,
- using computers for purposes irrelevant to this class (e.g., communications, web browsing)
- using inappropriate, including verbally abusive, language,
- displaying defiance or disrespect to others, or
- behaving aggressively toward others

Students who engage in these inappropriate behaviors may be asked to leave the class and may in addition be subjected to disciplinary action.

Semester Schedule

Date	Topic	Assignment/Reading	Instructor
8/29	Introduction to HSR	Go through online training in HSR http://www.nlm.nih.gov/nichsr/ihcm/index.html	Brown
9/5	Theoretic foundations of health services usage	Behavioral Medicine course starts https://www.edx.org/course/kix/kix-kibehmedx-behavioral-medicine-key-1527#.U_5edWPDVq1	Brown
9/12	Access to healthcare care		Brown
9/19	Quality of healthcare services		TBD
9/26	Cost/expenditure of healthcare services		Brown
10/3	Evaluation of healthcare services		Brown
10/10	<i>PICORI and Comparative Effectiveness research</i>		
10/17	<i>Analyzing state hospital data</i>	Presentation 1 in class	Kristynn Sullivan
10/24	Assessing quality in hospitals		

10/31	Assessing quality in primary care		
11/7	Sustainability of healthcare interventions	Submit draft of paper for peer review 11/7	
11/14	Dissemination and Implementation Science		
11/21	<i>Health policy</i>		
11/28	THANKSGIVING - NO CLASS		
12/5	<i>Final presentations</i>		Class members
12/12	<i>Final presentations</i>	Final papers due	Class members

Appendix E2: Public Health Dissertation Syllabus

Description

The dissertation is the final and central benchmark for graduate students in the Public Health Ph.D. program. The successful accomplishment of this benchmark is demonstrated through the production of a dissertation manuscript that presents an original research project and its results, along with an oral defense of the manuscript. The quality of the dissertation and the defense of it are evaluated by the Dissertation Committee in order to determine whether the graduate student has successfully completed this final benchmark for the Ph.D. degree. Graduate students should reference and submit the appropriate forms for finalizing their Dissertation Committee members prior to finalizing their Dissertation Proposal document. Likewise, graduate students shall submit the appropriate forms for scheduling both the Defense of the Dissertation Proposal document and the Defense of the Dissertation manuscript.

Learning Goals

Through the process of writing and presenting the dissertation manuscript, graduate students refine their understanding of processes and theories in the student's major area of emphasis, appropriate public health research methods, and competent written and oral communication of the research project. Overall, the graduate students demonstrate competency in all of the Program Learning Outcomes through their dissertation.

The Dissertation Proposal

The Dissertation Proposal serves three primary functions. First, it reviews the relevant literature and in so doing defines the area of inquiry of the proposed Dissertation. Second, it provides a clear statement of actionable research questions that will be addressed in the Dissertation. Third, it outlines the methodological and analytic approach that will enable the proposed research to answer the research questions.

The Dissertation Proposal should be approximately 20 to 30 double-spaced pages (not including references and appendices). It is advisable for a student to work with the Faculty Advisor until the student and the advisor deem the Dissertation Proposal of sufficient quality to pass to the Candidacy Committee. Optionally, graduate students are encouraged to share drafts of the proposal with members of the Candidacy Committee informally for their feedback and revisions prior to finalizing the Dissertation Proposal document. Candidacy Committee members should make every effort to provide such feedback in a timely fashion, but should inform the student promptly if they will be unable to provide such informal feedback. When the finalized Dissertation Proposal is submitted, the Candidacy Committee should have at least 7 days in which to review the Dissertation Proposal prior to the Proposal Defense Meeting.

While working on the Dissertation Proposal students must enroll in PH 299.

The Defense of the Dissertation Proposal

To schedule a Defense date, graduate students must consult with Candidacy Committee members to schedule a proposal defense meeting, at which all members of the committee must be present in person (or via conference call under extenuating circumstances such as a Candidacy Committee member being on sabbatical or at a distant site). Graduate students are responsible for securing a room for the Defense with a minimum of two hours for the meeting.

The proposal defense consists of an oral presentation of the proposed Dissertation research by the student, followed by questions from the Candidacy Committee and possibly other audience members. The student is tasked with responding to the questions clearly and coherently. This portion of the meeting is open to the public. Students are responsible for ensuring that announcement of the oral defense time and location is made in appropriate forums such as an email list serve or a Public Health bulletin board.

At the conclusion of the public portion of the defense, the student and the Candidacy Committee will excuse the public in order to discuss the proposal with the student in private. At the conclusion of committee questions, the graduate student leaves the room, allowing the Candidacy Committee members to deliberate on the readiness of the proposal. The Committee engages in discussion around the student's accomplishment of the Program Learning Outcomes through the Dissertation Proposal at the "advanced" level referencing the rubric. Based on the discussion, the Committee makes one of the following recommendations:

Pass: The proposal is passed and the student may commence with the proposed research.

Fail: The proposal requires major or minor revision.

If the committee recommends failure of the proposal, the student must revise the proposal in light of committee feedback and resubmit the proposal within three months. At that time, the student must reschedule the proposal defense and complete it satisfactorily before undertaking any dissertation research.

The Dissertation

Candidates prepare the manuscript under the supervision of the Faculty Advisor who requests revisions until s/he judges that the work is ready to be reviewed by the remaining Doctoral Committee members. Although there are no set criteria for dissertation length or content, students are expected to produce a body of work that contains a thorough review of the literature, novel theory, novel data collection and/or analysis, and at least three substantive chapters. One of two formats is typically used. Dissertations should be convertible to three related, but separable articles or one book. The format of the Dissertation manuscript should be approved by all members of the Doctoral Committee.

Once the dissertation document is complete in the opinion of the student and his or her Faculty Advisor, the Candidate circulates the Dissertation among Doctoral Committee members. The Doctoral Committee should provide crucial comments, possibly leading to another revision before the final submission and the scheduling of the Dissertation Defense. Doctoral Committee members should provide these comments in a timely fashion.

The complete Dissertation must be provided to the Doctoral Committee members at least 14 days prior to the scheduled defense.

The Defense of the Dissertation

The defense of the Dissertation is a capstone event in the student's graduate career. It consists of an oral presentation of the Dissertation manuscript by the candidate, followed by questions from the Doctoral Committee and possibly other audience members. The Candidate is tasked with responding to the questions clearly and coherently towards a rigorous engagement with the original research. This portion of the meeting is open to the public. Candidates are responsible for ensuring that announcement of the oral defense time and location is made in appropriate forums such as an email list serve or a Public Health bulletin board.

At the conclusion of the public portion of the defense, the Candidate and the Doctoral Committee will excuse the public in order to discuss the Dissertation with the Candidate in private. At the conclusion of committee questions, the Candidate is excused and the Doctoral Committee deliberates on whether to pass the Dissertation. The committee engages in discussion around the student's accomplishment of the Program Learning Outcomes through the Dissertation Proposal at the "mastery" level referencing the appropriate rubric.

At the conclusion of these deliberations, the Doctoral Committee shall vote on the question of whether both the written dissertation and the student's performance during the defense are of sufficient quality to warrant the awarding of a Ph.D. degree from the University of California. A unanimous vote is required to pass.

When all members of the Doctoral Committee have voted to award the degree they must sign the graduate division form [*Report on Final Examination for the Ph.D. Degree*](#), recommending conferral of the Ph.D., subject to final submission of the approved Dissertation for deposit in the University Archives (see *Graduate Advisor Handbook*, Section VII. H.8).

Appendix E3: Public Health Second Year-Thesis Rubric

Overall Score: Ph.D. Pass/Master Pass/Fail

Criteria	Score by Criteria	Comments / Feedback
Breadth: Demonstrates a understanding of Public Health within the context of current research	Ph.D. Pass Master Pass Fail	
Depth: Demonstrates an expertise in a specific subfield of Public Health and identify novel research questions within the context of current research	Ph.D. Pass Master Pass Fail	
Methods: Essay demonstrates an understanding of methods used in the literature and an ability to critique the selection and implementation of these methods.	Ph.D. Pass Master Pass Fail	
Communication: The essay thoughtfully argues a thesis in a clear, concise, and organized manner. The essay uses conventional grammar and syntax.	Ph.D. Pass Master Pass Fail	
Transdisciplinary research: Demonstrates an understanding of transdisciplinary approaches as it relates to the current research	Ph.D. Pass Master Pass Fail	
Translational research: Demonstrates an understanding of translational approaches to dissemination as it relates to the current research	Ph.D. Pass Master Pass Fail	
Research: The essay demonstrates an ability to generate ideas for new research projects by identifying limitations and flaws in existing work	Ph.D. Pass Master Pass Fail	
Professionalization: The essay reflects an understanding of the intellectual goals of the discipline and demonstrates an appropriately professional voice when critiquing research.	Ph.D. Pass Master Pass Fail	

Appendix E4: Public Health Qualifying Examination Rubric

Qualifying Examination rubric

The Qualifying Exam in Public Health consists of proposing, completing, and orally defending a substantial research paper. Completion of the written paper constitutes the written portion of the Qualifying Exam. This paper shall represent the student's field of specialization, prepare the student for the dissertation research, and be of *publishable quality*. As such the paper must be novel and advance knowledge in the field. It is expected to be longer than a typical course or seminar paper at 35 to 45 double-spaced pages in length, not counting references.

During the oral exam, at the discretion of the Candidacy Committee (CC), the student may first present a brief (10-15 minute) overview of the paper. The CC will then discuss the subject addressed in the review with the student. The student is expected to be able to answer questions on all aspects of the subject to the satisfaction of the CC. Following the completion of the oral exam, the CC makes a recommendation whether to pass the student on the Qualifying Exam. The CC recommendation is by majority vote with no more than one dissenting vote, leading to one of the following recommendations:

Pass: Oral and written portions of the Qualifying Exam are passed and the student may Advance to Candidacy.

Minor Revisions: The oral portion of the Qualifying Exam is passed and the written portion passed pending minor revisions, which must be approved by the Faculty Advisor and any CC member wishing to review such changes. The timeline for revisions will be determined by the CC at the time the decision is made.

Major Revisions: The oral or written portion of the Qualifying Exam is not passed. The student must revise the review paper in light of any CC feedback and resubmit the paper within 6 weeks to make and submit those revisions, and the CC will then have at least 14 but no more than 28 days to review the revisions. A second oral exam must then be held with the student, after which the CC makes a recommendation whether to pass the student on the Qualifying Exam. A failure to oral pass either the written or oral portion of this second exam must be addressed in the student's next Biannual Review Progress Report (see below), which must then involve the student's entire Faculty Advisory Committee. Any further examination must have the approval of the Graduate Dean.

The Qualifying Examination rubric is used to assess student learning as revealed in their writing and in response to questions during their oral examination.

Qualifying Exam

Criteria	Score	Comments
<p>1. Depth of knowledge in PH field.</p> <ul style="list-style-type: none"> • The research question(s) to be addressed is properly situated in the relevant literature • Theoretical arguments and hypotheses flow from and/or are consistent with previous studies • Student is able to verbally convey the originality and importance of the project in the context of the existing literature 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced* ○ Introductory 	Document:
		Oral:
<p>2. Methods: Essay demonstrates an understanding of mixed methods used in reviewing and discussing the literature and an ability to critique the selection and implementation of these methods.</p> <ul style="list-style-type: none"> • Identify appropriate research designs for the question being addressed • Appropriate data is identified • Student clearly answers questions and convincingly discusses advantages and limitations of the methods used in previous studies 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced ○ Introductory 	Document:
		Oral:
<p>4. Communication - Effective scientific communication skills, especially the ability to convey complex concepts and information in a clear and concise manner.</p> <ul style="list-style-type: none"> • Dissertation is clearly and precisely written so that it is fully understandable to public health researchers • Where appropriate, the dissertation makes good use of tables and figures to accurately summarize and convey information • Student clearly answers questions and convincingly discusses advantages and limitations of the method used 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced ○ Introductory 	Document:
		Oral:

<p>5. Transdisciplinary research: Demonstrates an understanding of transdisciplinary approaches as it relates to the current research</p> <ul style="list-style-type: none"> • Student conveys an understand of transdisciplinary approaches and contributions other disciplines and approaches have made to addressing the public health phenomena • Student clearly answers questions and convincingly conveys role of transdisciplinary research in relationship 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced ○ Introductory 	Document:
		Oral:
<p>6. Translational research: Demonstrates an understanding of translational approaches to dissemination as it relates to the current research</p> <ul style="list-style-type: none"> • Student discusses how previous studies have ensured results are translated and disseminated to stakeholders • Student clearly answers questions and convincingly discussions options for translating the finds of this study to stakeholders 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced ○ Introductory 	Document:
		Oral:
<p>7. Professionalism - Proficiency in the skills needed to participate in the intellectual and organizational aspects of the profession of Public Health.</p> <ul style="list-style-type: none"> • Written work displays the qualities needed to participate in the profession of Public Health such as the methods and information are cohesively presented in a way that demonstrates fluency in disciplinary literature • Oral work displays the qualities needed to participate in the profession of Public Health such as the ability to freely but critically exchange ideas in a scholarly setting 	<ul style="list-style-type: none"> ○ Mastery ○ Advanced ○ Introductory 	Document:
		Oral:

Result:

Pass _____ *Fail* _____

* All 5 criteria should be reached at the Advanced level. A score of introductory on any criteria results in a failing score.

Appendix E5: Public Health Dissertation Rubrics

The Dissertation Proposal rubric is used to assess student learning as demonstrated in the Dissertation Proposal document and oral presentation of the document. Students receive a single score for both the document and oral portions for each criterion (PLO). Students also receive an overall score for the benchmark. During the closed session of Committee deliberation, the Committee agrees on one score for all six criteria and the overall outcome.

Committee members should consider:

- Are each of the sub-criterion present for the criteria (check off those which are present)?
- What comments does the student need in order to fully interpret each of the criterion scores?
and
- What overall score does the student receive for the overall benchmark (pass or fail)?

A hard copy of the completed rubric is submitted by the student to the Public Health Graduate Curriculum Committee for assessment data collection.

Public Health Dissertation Manuscript

Criteria	Comments
<p>1. Depth of knowledge in PH field.</p> <ul style="list-style-type: none"> • The research question(s) to be addressed is properly situated in the relevant literature • Theoretical arguments and hypotheses flow from and/or are consistent with existing results • Originality and importance of the project is demonstrated in the context of the existing literature 	Document:
	Oral:
<p>2. Competency with contemporary public health research methods used to conduct rigorous research on public health phenomena.</p> <ul style="list-style-type: none"> • Research design is appropriate for the hypotheses to be tested (e.g., will allow for proper causal inference) • Appropriate data is identified • Use of methods to engage phenomenon is rigorous 	Document:
	Oral:
<p>3. Effective scientific communication skills, especially the ability to convey complex concepts and information in a clear and concise manner.</p> <ul style="list-style-type: none"> • Dissertation is clearly and precisely written so that it is fully understandable to public health researchers • Where appropriate, the dissertation makes good use of tables and figures to accurately summarize and convey information • Student clearly answers questions and convincingly defends dissertation orally 	Document:
	Oral:
<p>4. Transdisciplinary research: Demonstrates an understanding of transdisciplinary approaches as it relates to the current research</p> <ul style="list-style-type: none"> • Dissertation clearly identifies the contribution of other disciplines to the research question, and places the results in the context of other approaches • Student clearly answers questions placing the research in context of other approaches 	Document:
	Oral:
<p>5. Translational research: Demonstrates an understanding of translational approaches to dissemination as it relates to the current research</p> <ul style="list-style-type: none"> • Dissertation clearly identifies the contribution of other disciplines to the research question, and places the results in the context of other approaches • To the extent possible, the dissertation describes how the results from the study will be disseminated to relevant stakeholders and the parties who will be responsible for implementing/using the results from the study • Student clearly identifies stakeholders and describes the process of engagement 	Document:
	Oral:

<p>6. Ability to initiate and conduct independent research that makes an original contribution to Public Health knowledge of a quality that can be published in a peer reviewed outlet.</p> <ul style="list-style-type: none"> • Dissertation makes a convincing case for the originality and importance of the research question(s) to be addressed through synthesis and critique of current literature • Dissertation presents theoretically-motivated hypotheses • Methods are described in sufficient detail to allow replication • Results are described and illustrated in a clear and appropriate manner • Research project could be published in a peer reviewed outlet, as evidenced by the demonstrated originality/importance of the research question, theoretical innovations, and rigorous research design 	<p>Document:</p>
<p>7. Proficiency in the skills needed to participate in the intellectual and organizational aspects of the profession of Public Health.</p> <ul style="list-style-type: none"> • Written work displays the qualities needed to participate in the profession of Public Health such as the methods and information are cohesively presented in a way that demonstrates fluency in disciplinary literature • Oral work displays the qualities needed to participate in the profession of Public Health such as the ability to freely but critically exchange ideas in a scholarly setting 	<p>Oral:</p>
<p>Result:</p> <p><i>Pass</i> _____ <i>Fail</i> _____</p>	

Appendix E6: Student Progress Report Form

Public Health Student Progress Report Form

Date: _____

Name of Student: _____

Year entered program: _____

Second Year Research Thesis Pass Fail

Qualifying Exam Pass Fail

Candidacy/Doctoral Committee (if appropriate):

_____ (Chair/Faculty Advisor)

_____ (Member)

_____ (Member)

Overall Progress

Satisfactory Unsatisfactory

_____ (Faculty Advisor, sign and date)

_____ (Student, sign and date)

Part I

Summarize the progress you have made toward the degree during the past year (course work, exams, research, publications, presentations). How would you rate your progress?

If you have advanced to candidacy, summarize what you need to accomplish in order to have a defensible dissertation and give your best estimate of when that might occur.

Are there additional activities outside the standard program requirements that you feel would be helpful to your professional development? (Examples: additional coursework or self-study, training in specific skills, language training, writing instruction, symposia or short courses at conferences.)

Part II

Summarize the progress the student has made toward the degree during the past year (course work, exams, research, publications, presentations). Note any specific or general areas of concern.

If the student has advanced to candidacy, summarize what the student needs to accomplish in order to have a defensible dissertation and give your best estimate of when that might occur.

Note any additional recommendations for this student’s professional development outside the standard program requirements. (Examples: additional coursework or self-study, training in specific skills, language training, writing instruction, symposia or short courses at conferences).

Rate the student on the following Program Learning Objectives

PLO 1: Breadth Knowledge PH	Introductory Developing Mastery
PLO 2: Depth Knowledge PH Field	Introductory Developing Mastery
PLO 3: Methods	Introductory Developing Mastery
PLO 4: Communication	Introductory Developing Mastery
PLO 5: Transdisciplinary research	Introductory Developing Mastery
PLO 6: Translational Research	Introductory Developing Mastery
PLO 5: Independent Research	Introductory Developing Mastery
PLO 6: Professionalism	Introductory Developing Mastery

Appendix F :
Information Required by California Postsecondary Education Commission (CPEC)

1. Name of Program: Public Health

2. Campus: Merced

3. Degree/Certificate: MSPH, Ph.D.

4. CIP Classification: (to be completed by UCOP) _____

5. Date to be started: July 1, 2016

6. If modification of existing program: New program

7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, offered in California?):

The proposed focus of the Ph.D. - Prevention Sciences - builds on the expertise of our faculty, the resources on campus, and our unique position of being located in a rural, underserved, ethnically diverse region. Specifically, the program focuses on training students to conduct research aimed at preventing chronic and infectious diseases in rural, underserved, disadvantaged, ethnically diverse communities. The program will emphasize the role of transdisciplinary approaches to addressing public health challenges, and train students to conduct and disseminating their research to diverse groups, including community members and organizations, healthcare providers, and policy makers. Our program aims to successfully place graduates in tenure-track jobs in academia, or research positions in industry, government, or non-governmental organizations.

While other programs in the University of California system offer training in Prevention Sciences, including chronic and infectious diseases, our program is unique in making transdisciplinary approaches to addressing problems of vulnerable and diverse populations in a rural setting, the focus of the training students will receive during their study. This approach, developed by faculty on campus starting in 2009, utilizes the existing strengths on campus, including resources and expertise in translational sciences and transdisciplinary research (e.g., HSRI, the Blum Center, and ReCESS), experience in conducting transdisciplinary and collaborative research with communities, healthcare providers, and policy makers to address the health challenges facing rural, underserved, ethnically diverse communities, and the interests of our targeted students.

8. Type(s) of students to be served:

Based on our consultations with the Directors of the Public Health Departments in the San Joaquin Valley, the Public Health faculty at California State University Fresno, health science faculty at California State University Stanislaus, representatives from other University of California campuses, and our student body, we anticipate our graduate program to be attractive to three groups of potential students: Recent graduates with an undergraduate degree in Public Health, Human Biology, or other related disciplines; Recent graduates with a Masters of Public Health from one of the Masters of Public Health programs at a California State University campus; and professionals working in Public Health field in the San Joaquin Valley or elsewhere in California who wish to pursue a Ph.D. in community based research. For instance, of the six students currently pursuing a Ph.D. through the Individualized Graduate Program (IGP) with an emphasis on Social and Cognitive Science, two are Assistant Professors in nursing at a local California State University campus, one is a Director of Public Health Department in a county in the San Joaquin Valley, one is a medical doctor returning to pursue a research degree, and two are recent graduates with a Masters in Public Health from California State University, San Francisco who are interested in research relating to vulnerable populations in the San Joaquin Valley.

We expect to admit 7 students per year. Based on our consultations and market research, we expect to attract students seeking training in conducting research relevant to rural, underserved, and ethnically diverse regions of the county and the world. To the extent that our prospective students are similar to the current composition of UC Merced students (45% Hispanic, 6% African American, and 25% Asian; 60% first generation college students), and given UC Merced's designation as a Hispanic Serving Institution, we anticipate being well placed to attract training grants to support our graduate students. We do not expect to compete for students with the existing programs in the UC but rather see our program as adding to the options available to students interested in studying Public Health within the UC system.

9. If program is not in current campus academic plan, give reason for proposing program now:

The vision to promote Public Health at UC Merced was first articulated by UC Merced faculty and administration in the Strategic Vision of 2009. Since that time, we have taken great strides to achieve this vision, including introducing an organized research unit dedicated to promoting health research (the Health Sciences Research Institute), introducing an undergraduate major and minor in Public Health, and continuing to promote the development of medical education in the region (the San Joaquin Valley PRIME program). The vision to promote health research and education through 2020, including Public Health, has recently been articulated in the Human Health Sciences proposal as part of the Strategic Academic Focusing (SAF) initiative currently ongoing at UC Merced. This proposal describes a number of concrete steps the campus can follow to continue to develop health related research and education on campus, including introducing a research doctorate in Public Health.

10. If the program requires approval of a licensure board, what is the status of such approval?

No such approval is required.

11. Please list special features of the program:

Our program will emphasize the use of mixed methods and transdisciplinary approaches to addressing the prevention of chronic or infectious disease in rural, underserved, and ethnically diverse communities.

Mixed methods research has been defined as a research approach or methodology that:

- focuses on research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences;
- employs rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs;
- utilizes multiple methods (e.g., intervention trials and in-depth interviews);
- integrates or combines these methods to draw on the strengths of each; and
- frames the investigation within a philosophical and theoretical positions

Transdisciplinary research (or 'team science') is a collaborative approach to conducting research that involves having researchers from different fields of expertise to address public health challenges. As opposed to single-investigator driven approaches, transdisciplinary research seeks to coordinate teams of investigators with diverse skills and knowledge to study complex social problems with multiple causes. This teamwork becomes interdisciplinary when there is a link, blend, and synthesize between separate approaches, and becomes transdisciplinary when (1) there are new conceptual and methodological frameworks and (2) when stakeholders from multiple sectors of society participate in solving "real-world" problems.

12. List all new courses required

Course requests and syllabi for all courses will be submitted in the year prior to the course's offering. Catalog descriptions of all courses are in Appendix D of the proposal.

13. List all other required courses

Required: Core Public Health courses- 7 courses (24 units)

- PH 201: Foundations of Public Health (4 units)
- PH 202: Epidemiology (4 units)
- SOC 210: Statistics 1: Regression Analysis (4 units)
- SOC 211: Statistics 2: Categorical Regression Analysis (4 units)
- PH 203: Research Methods (4 units)
- PH 208a: Professionalization seminar (2 units)
- PH 208b: Professionalization seminar (2 units)

Required: Discipline - 1 course (4 units)

- PH 204: Environmental Health (4 units)
- PH 205: Health Services Research and Policy (4 units)
- PH 206: Health Communication (4 units)
- PH207: Social and Behavioral Theory in Public Health (4 units)

Required: Advanced methods - 1 course (4 units)

- PH 223: Qualitative Research Methods for Public Health (4 units)
- PH 224: Environmental Epidemiology (4 units)
- PH 225: Advanced Quantitative Methods (4 units)

Electives: (24 units)

- PH 204: Environmental Health (4 units)*
- PH 205: Health Services Research and Policy (4 units)*
- PH 206: Health Communication (4 units)
- PH 207: Social and Behavioral Theory in Public Health (4 units)
- PH 221: Social Epidemiology (4 units)
- PH 222: Program Design and Evaluation (4 units) *
- PH 223: Qualitative Research Methods for Public Health (4 units)
- PH 224: Environmental Epidemiology (4 units)*
- PH 225: Advanced Quantitative Methods (4 units)*
- PH 235: Pesticides, Health, and the Environment (4 units)
- PH 236: Vector Ecology for Public Health (4 units)
- PH 241: Public Health Genetics (4 units)
- ES 234: Air Pollution and Resources (3 units)
- PSY 202C: Multivariate Analysis (4 units)
- PSY 208A: Methods for Program Evaluation (4 units)
- PSY 208B: Theory of Program Evaluation (4 units)
- PSY 206: Quantitative Methods for Reviewing Research (4 units)
- PSY 220: Health Psychology (4 units)
- PSY 221: Issues in Health Psychology (4 units)
- PSY 224: Health Disparities (4 units)
- PSY 225: Health Risk Decision Making (4 units)
- PSY 230: Developmental Psychology (4 units)
- PSY 280: Human Behavioral Genetics (4 units)
- Soc 230: Stratification (4 units)
- Soc 245: Sociology of Health (4 units)

** If taken to fulfill the discipline or advanced methods requirement, the course cannot fulfill the elective requirement. That is, no double counting of courses.*

Additional Requirements

All students must maintain a GPA greater than 3.0. In the case a student does not meet this standard, they will be put in academic probation for the duration of one semester. Should they still not meet this standard, they may be dismissed from the graduate program at the discretion of the Graduate Group Chair for failure to make due progress in the program.

14. List UC campuses and other California institutions which now offer or plan to offer this program or closely related programs:

In California, there are currently seven Schools of Public Health in existence or proposed (UCLA, UC Davis, UC Berkeley, UC Irvine, USC, Loma Linda, and Claremont), one joint MPH/Ph.D. program (UCSD/SDSU), and a number of programs that offer a terminal MPH degree (Fresno State University, Cal State Northridge, Long Beach State, Cal State Fullerton, San Francisco State, and San Jose State). The School of Public Health at UC-Berkeley offers Ph.D. degrees in Biostatistics, Environmental Health Sciences, Epidemiology, Health Services and Policy Analysis and Infectious Diseases. The UCLA School of Public Health offers Ph.D. degrees in Biostatistics, Community Health Sciences, Environmental Health Sciences, Epidemiology, and Health Services. The Public Health program of UC-San Diego offers Ph.D. in Public Health with possible concentrations in global health, health behavior, and epidemiology. UC Davis offers Ph.D. degrees in Epidemiology, Biostatistics, and Pharmacology & Toxicology, each administered by a different graduate group composed of members of various academic units. And the Ph.D. program at UC Irvine offers a Ph.D. in Global Health and Disease Prevention. No institution located in the San Joaquin Valley offers a Ph.D. program.

Our program shares characteristics with the programs at the other UC campuses. All campuses offer the type of academic Ph.D. that we are proposing. All programs offer training in Prevention Sciences (or equivalent), provide training in community based participatory research (CBPR), and promote dissemination and implementation of the results (translational research). UC Irvine's program focuses on admitting and training a small number of students in interdisciplinary and participatory research, with an emphasis on hypothesis-driven research to identify successful strategies for reducing the burden of chronic and infectious diseases in vulnerable populations. As with the UCSD/SDSU joint program, we have many collaborations with CSU Fresno, and we will seek to establish close ties with other CSU campuses. Our program shares some similarities to the proposed program from UC Davis in Public Health Sciences, with both programs emphasizing the importance of dissemination and implementation research, and looking to provide culturally relevant training to Ph.D. students.

The fact that our program is similar in some respects to the programs offered at other UC campuses is a sign that we are proposing a concentration (Prevention Sciences) that other campuses see as appropriate for Ph.D. program in Public Health. What distinguishes our program is that we will utilize the strengths of our campus (opportunities for transdisciplinary research, diverse faculty with experience working with rural, vulnerable groups), existing expertise and resources on campus regarding translational and participatory research (HSRI, Blum Center, and ReCESS), and a natural laboratory in which to conduct research (SJV) to offer students more targeted and focused training in conducting research with rural, ethnically diverse, underserved communities than is available elsewhere in the UC system. As described below in our course of study, our proposed program emphasizes translational research and community based participatory research, including training students to work with diverse populations in underserved

communities, to address relevant public health challenges. Moreover, students will be actively encouraged to work in transdisciplinary research teams composed of our diverse faculty and other stakeholders in order to maximize the translational potential of their research projects. While these opportunities are present at other UC campuses, they are the center piece of our program and thus will attract students who are looking for this type of experience and training.

15. List any related program offered by the proposing institution and explain the relationship:

There are no similar programs at UC Merced.

16. Summarize employment prospect for graduates of the proposed program. Give results of a job market survey if such has been made:

Public Health Ph.D. students can find employment in governmental agencies at the federal, state, and local level, healthcare financing and delivery organizations, non-governmental public health organizations, and private industries.⁴⁹ An assessment of the state of public health in the United States sponsored by the **Centers for Disease Control and Prevention's Public Health Workforce Development Initiative** found that not only is there a workforce shortage,⁵⁰ but that much of the workforce is untrained.⁵¹ This assessment of the US public health workforce found that there was a mismatch between current workforce skills and projected needs.⁵² In particular, the need to create practice-oriented researchers who conduct studies that improve public health practices was identified.⁵³ Individuals trained in scientific research will be needed to design and evaluate new and innovative public health interventions and to assess policy implications and policy costs. While there is a growing demand for a more educated public health research work force at the national level, California, in particular, is plagued by a limited applicant pool for trained public health professionals. A 2014 report titled *Public Health Education and the University of California*⁵⁴ noted a strong demand for graduate programs in public health research education to help fill the need for researchers who can address contextual health issues associated with the demographic and epidemiological shifts taking place in California. Our graduates will help fill the need for trained public health researchers in both the public and private arena. In addition our program will help to fill the need for faculty members to train the next generation of public health researchers. As a result, we anticipate that our graduates will help fill the growing demand for trained public health researchers, and will help fill the need for mid-career training in the current

⁴⁹ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/files/public_health.pdf. Accessed July 21, 2014.

⁵⁰ Denise Koo. Modernizing the Workforce for the Public's Health: Shifting the Balance. Presented at *Public Health Workforce Summit, Modernizing the Workforce for the Public's Health: Shifting the Balance* in Atlanta, GA. December 13-14, 2012.

⁵¹ Ibid.

⁵² Fleming D. Destinations for a Public Health Workforce Roadmap, A Perspective from the Front Lines. Presented at *Public Health Workforce Summit, Modernizing the Workforce for the Public's Health*, Atlanta, GA. Dec 13-14, 2012.

⁵³ Ibid.

⁵⁴ Public Health Education and the University of California. Final Report of the Health Sciences Committee – April 2014. Available at http://www.ucop.edu/health-sciences-services/files/public_health.pdf, page 12.

public health workforce.

17. Give an estimated enrollment for the first five years and state the basis for the estimate:

We expect the six Public Health related graduate students admitted through the Individualized Graduate Program (IGP) with an emphasis on Social Science to transfer to the Public Health Graduate program upon its inception. For the near term we anticipate entering classes of 7 students per year starting in 2016/17.

18. Give estimates of the additional cost of the program by year for 5 years in each of the following categories:

a. **FTE Faculty:** As a young university, UC Merced has constantly added new FTE faculty. Funds for new faculty lines, and for associated startup costs, are allocated by the Provost through the strategic planning process, with consultation by pertinent UC Merced Academic Senate committees. Since our first Public Health academic joined UCM in 2011, we have added 2-3 faculty members per year. At the beginning of 2014/15, there were seven Core Faculty in Public Health, with an additional faculty member (senior level in Prevention Sciences) on target to begin on January 1, 2015. In addition, befitting the transdisciplinary nature of Public Health, an additional eight faculty members with appointments in other departments will be Active members of the Public Health Bylaw 55 Unit and thus members of the Public Health Graduate group. All members of the Graduate Group are prepared to supervise graduate students.

b. **Library Acquisitions:** The current library holdings need to be expanded to support health-related faculty research. Judging by the number of faculty affiliated with HSRI (77 as of December 2014), there is currently significant demand for additional health-related resources irrespective of the needs of Public Health graduate students. All faculty and health-related graduate students, including those in Health Psychology, Public Health, and Molecular and Cell Biology, would benefit from an expansion of the library resources. The cost of additional library holdings is estimated to be between \$40,000 to \$45,000 per year.

c. **Computing:** No additional resources are required.

d. **Other facilities and equipment:** Public Health faculty have varying equipment needs for their research. We expect these needs to be met with the normal start-up packages allocated to the University for the recruitment of new faculty. As a result, no additional resources will be needed with respect to equipment.

Public Health faculty require one office per faculty member. Teaching assistants need (shared) office

space as well. Some Public Health faculty require separate secure data offices as well, these can be shared. At present, the space is adequate to meet the needs of the Public Health Graduate program.

19. How and by what agencies will the program be evaluated.

The Public Health Graduate Curriculum Committee will oversee the collection and analysis of program assessment data, including a Program review every 7 years and a yearly self-assessment process. UCM policy regarding the periodic review of graduate programs is described in the document entitled Graduate Academic Program Review Policy and Procedures (May 2013).⁵⁵ The Public Health program review will follow those procedures and timeline, with data for WASC assessment being collected each year to assess our progress with achieving the Program Learning Outcomes (PLOs).

As is the case for all UCM graduate programs (in accord with procedures approved by the Graduate Council), the Public Health Graduate group will be evaluated by a program review committee of UC faculty on a seven year cycle. The Public Health Graduate Studies Committee will prepare a self-report for review by the committee in accord with UC policy that includes annual assessment reports on student learning and program benchmarks, course offerings and teaching loads, and the overall advancement of the program. After reviewing this document, the program review committee will meet with Public Health Graduate group faculty and students and review the program. The Public Health Graduate Group Chair and Dean of Social Sciences, Humanities, and Arts will then prepare and present a response to the self-study to the program review committee. The review ends when the program review committee reports its satisfaction with the program's response to the Graduate Council.

We will regularly administer surveys of graduating students in order to define problems and to initiate solutions in timely manner. UC Merced has established exit surveys for graduating Master's and Ph.D. graduate students, which will provide our Graduate Group with data once our first cohort graduates. Also, the University began administering surveys to graduate alumni in July 2012. We will add program specific questions to the survey, so that the University can supply us with these data as soon as we have alumni from which to sample. These surveys will provide both subjective (indirect evidence) and objective data (direct evidence) collected on student outcomes, such job placements, as well as students' experiences with university resources, faculty, and peers. Additional data will be collected via our university student database, such as time to degree and time to candidacy. We will also collect student work (direct evidence) at multiple levels including the second year thesis, qualifying examinations, and dissertation manuscripts (including an oral defense). Indirect evidence will come from annual progress reports collected each Spring from faculty for each graduate student who they advise during that academic year. Further, we will annually collect and compile data from annual graduate student progress reports on student presentations at regional and national conferences, publications, and funding applications

⁵⁵ http://senate.ucmerced.edu/sites/senate.ucmerced.edu/files/public/Graduate%20Program%20Review_Policy_Approved_5.09.14.pdf.

submitted and received, to gauge our students' engagement in these activities. For some PLOs, another source of indirect evidence will be TA evaluations completed by undergraduates who had the graduate student as a TA. This data will be used to adjust and improve the program as needed, keeping central the Program Learning Outcomes as the guide for the advancement of the program.