

COORDINATING COMMITTEE ON GRADUATE AFFAIRS

Notice of Meeting

Wednesday, December 5, 2018

10:00 a.m. – 4:00 p.m.

Room 5320

Join via Zoom: <https://UCOP.zoom.us/j/238417013>

Action	Item	Page
Action 10:00-10:05	I. Approval of the Agenda and the Minutes of the November 7 meeting. <i>Action Requested: Approve the agenda and minutes as noticed.</i>	pp. 1-6
Information 10:05 – 10:15	II. Chair’s Report - Chair Onyebuchi Arah	
Information 10:15 – 10:30	III. Vice Chair’s Report – Vice Chair Ramesh Balasubramaniam	
Information 10:30 – 11:00	IV. Publisher Negotiations <i>Rich Schneider, UCOLASC Chair</i>	
Information/ Discussion 11:00 – 11:10	V. Granting of Posthumous Degrees - Chair Onyebuchi Arah	
Information/ Discussion 11:10 – 12:00	VI. Announcements from Academic Affairs <i>Art Ellis, Vice President for Research and Graduate Studies</i> <i>Todd Greenspan, Director of Academic Planning</i> <i>Pamela Jennings, Executive Director of Graduate Studies</i> <i>Chris Procello, Academic Planning and Research Analyst</i>	
***Working Lunch ***		
Information/ Discussion 12:00 – 1:00	VII. Consultation with the Academic Senate Leadership <i>Robert May, Academic Council Chair</i> <i>Kum-Kum Bhavnani, Academic Council Vice Chair</i>	
Information/ Discussion/ Action 1:00 – 2:00	VIII. SSGPDP Systemwide Review - Chair Onyebuchi Arah	
Information/ Discussion/ Action 2:00 – 3:00	IX. New Program Proposals <i>All program proposals are posted to CCGA’s SharePoint site.</i>	
	A. Proposal to establish an MA in Global Health on the San Diego Campus – Lead Reviewer Glen Mimura <i>Action Requested: Provide an update and vote if possible.</i>	

- B. Proposal to establish a Master of Bioprocess Engineering on the Berkeley Campus [SSGPDP]
– *Lead Reviewer Teamrat Ghezzehei*
Action Requested: Provide an update and vote if possible.
- C. Proposal to establish an Interdepartmental Program in Biophysics for the MA/PhD degrees on the Riverside Campus.
– *Lead Reviewer Carlson Arnett*
Action Requested: Provide an update and vote if possible.
- D. Proposal to establish a Masters in Supply Chain and Logistics Management on the Riverside Campus [SSGPDP]
– *Lead Reviewer Leroy Westerling*
Action Requested: Provide an update for the committee.
- E. Proposal to establish a joint Entomology BS/MS Five-Year Combined Degree program on the Riverside Campus
– *Lead Reviewer Caroline Streeter*
Action Requested: Provide an update for the committee.
- F. Proposal to establish a MFA in Environmental Art and Social Practice at the Santa Cruz Campus
– *Lead Reviewer Nancy Peluso*
Action Requested: Provide an update for the committee.
- G. Proposal to establish a Master of Engineering at the Irvine Campus [SSGPDP] – *Lead Reviewer Lynn Russell*
Action Requested: Provide an update for the committee.
- H. Proposal to establish a Master of Presentation Design at the Irvine Campus [SSGPDP] – *Lead Reviewer Hyle Park*
Action Requested: Provide an update and vote if possible.
- I. Proposal to establish a PhD in Language Science at the Irvine Campus – *Lead Reviewer Gina Dent*
Action Requested: Provide an update and vote if possible.
- J. Proposal to establish an MS in Natural Language Processing at the Santa Cruz Campus – *Lead Reviewer Amr El Abbadi*
Action Requested: Provide an update for the committee.
- K. Proposal to establish an Online MBA Program on the Davis Campus [SSGPDP] – *Lead Reviewer Priya Ranjan*
Action Requested: Provide an update for the committee.
- L. Proposal to establish a Flexible Master of Social Welfare at the Berkeley Campus [SSGPSP]
– *Lead Reviewer Ramesh Balasubramaniam*
Action Requested: Provide an update for the committee.

<p>Information/ Discussion/ Action 3:00-3:30</p> <p>Information/ Discussion 3:30 – 4:00</p>	<p>M. For Committee Discussion: Change to existing UCI Master of Embedded and Cyber-Physical Systems (SSGPDP)</p> <p>N. Proposal for a Certificate Program in Supplemental Studies in Advanced Practice in Nursing on the San Francisco campus. <i>Action Requested: Assign a Lead Reviewer.</i></p> <p>X. For Committee Review and Discussion</p> <p>A. Medical Abortion at UC Student Health Centers and the UC SHIP Insurance Plan [from HCTF]</p> <ul style="list-style-type: none"> • <i>Is the referral policy and pharmacy access to Plan B enough? What more is needed?</i> <p>XI. Updates from the Campuses</p>	<p>PP.</p>
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Important Meeting Information

** Upon arrival, please check in at the security desk where you will be issued a visitor badge. **

Location: 1111 Franklin St., Oakland. [Directions and a map are available online.](#)

Parking: A visitor parking garage is on the 12th Street side of the UCOP building. Daily parking is also available at a number of lots proximate to the building.

From the Airport: If you are arriving by way of the Oakland airport, you may BART to the UCOP building. Take the airport's connecting tram to the Coliseum BART Station. From there board a Richmond or Pittsburg/Bay Point train and exit at the 12th Street/Oakland City Center station.

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Reimbursement: **Within 21 days**, please submit completed and signed travel voucher (with original receipts for expenses over \$75) to the Business Resource Center at:
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Account/Fund Number: M-430384-19900--03

COORDINATING COMMITTEE ON GRADUATE AFFAIRS

Minutes of Meeting

Wednesday, November 7, 2018

- I. Approval of the Agenda and the Minutes of the September 26 meeting.
Action Taken: *The agenda and minutes were approved as noticed.*

II. **Chair's Report** - *Chair Onyebuchi Arah*

From Academic Council:

- There are ongoing discussions about the student transfer guarantee that the President wants to put in place.
- The reorganization of UCOP is still underway. The Senate has been very appreciative of the help it received from the committee.
- There seems to be concern regarding the oversight of ANR.
- There are some changes in survivor benefits for faculty. Faculty should make themselves aware of the changes and take action if needed.
- BOARS and UCEP are looking into issues regarding standardized testing. More updates will follow.
- UCOLASC is undertaking the issue of Open Access and the rates/fees being charged by publishing houses. The Analyst will try to get the UCOLASC chair to come to the next meeting to discuss this issue.
- The President's Postdoctoral Fellowship Program has been incredibly successful and has brought some of the finest minds from the world to UC. It has really had a strong impact, and it contributes to UCs diversity pipeline. .

III. **Vice Chair's Report** – *Vice Chair Ramesh Balasubramaniam*

Campuses are concerned about the need for CCGA to get external reviewers for their proposals. Some campuses solicit external reviews on their own and there is some feeling that CCGA is duplicating the effort and slowing down the process. The graduate deans feel that CCGA's review is helpful and adds value. This was discussed at length by the committee. The Chair stressed that CCGA does provide value and is focused on building strong proposals, not in denying them.

Professor Zatz said that the graduate deans are thrilled that the Provost is embarking upon a UCHSI initiative. A pilot program is being developed and the funds are going to be split evenly across the 10 institutions. The goal is to increase the number of students coming from HSIs and to increase the diversity of the pipeline. Members have noted that UC has lost URM students because they are not comfortable on the campuses; there is not "critical mass." This also is related to faculty retention and how well the University supports underrepresented staff and faculty.

The President has said that she wants to increase the number of graduate students. There is a need for an analysis of the financial support for graduate education. She is also very interested in diversifying the professorialship.

IV. Announcements from Academic Affairs

Art Ellis, Vice President for Research and Graduate Studies

Todd Greenspan, Director of Academic Planning

Pamela Jennings, Executive Director of Graduate Studies

Chris Procello, Academic Planning and Research Analyst

VP Ellis said that there have been discussions about moving from single advisors to teams of advisors; some departments currently do this. His office is trying to determine the impact these different modes might have on the students.

Director Greenspan stated that OP has asked the campuses for four-year plans for funding rather than just one year at a time. Campuses are indicating they would like to grow 6500 grad students over four years. Twenty-one hundred of these will be in SSGPDPs programs, 900 will be in PDST programs, and 3500 are graduate academic programs. The budget to the Regents is asking for 1000 FTE to support this growth.

Analyst Procello told the committee that he will be reporting to APC on the Five Year Planning Perspectives. The program planning pipelines are returning to pre-great-recession levels. During this period (2011 to present), growth has not been even among the campuses and some areas are dominating. SSGPDPs and state-supported programs are at parity; and this is the first time that all campuses have approved at least one SSGPDP.

V. Consultation with the Academic Senate Leadership

Robert May, Academic Council Chair

Kum-Kum Bhavnani, Academic Council Vice Chair

Academic Council Chair May told the committee that the Senate has been asked by the President to look at standardized testing. GRE value is an issue that departments make on the campuses, and some are turning away from them. If UC decides to do away with the SAT it would have an incredible impact on the national educational scene. There are two areas – professional graduate student testing and undergraduate SAT testing. Grad admissions lies with the departments and undergrad is with the University. Executive Director Jennings voiced the hope that CCGA would look at the GRE; there is evidence that the exam disadvantages some groups and advantages others. It also been proven to not be a good indicator of student success. Chair May said that it would be useful for the committee to get a sense of methods of evaluation in different disciplines.

Chair May stated that most of the members likely had heard something about the represented Librarians and academic freedom. The librarian union has said they will not accept APM 010 and 015 as a prerequisite for academic freedom. He said that the issue not bargainable. Unit 18 Lecturers have it, but they have accepted 010 and 015. He went on to say that the Librarians have the strong support of the Senate, but have rejected 010 and 015 at the bargaining table. The union is trying to portray the University and the Senate as being against the Librarians. This is a really important issue for the Senate. The University Librarians released a statement absolutely supporting the Senate's view.

Chair May told the committee that there is not a big threat to retiree health at the moment. For current employees, there has been a very small increases in cost for Kaiser and the Blue and Gold Plan, but a large increase for UC Care; there is lot of concern about this. There is a worry that UC Care will enter the “death spiral” where healthy people will drop out of the higher premium program and cause costs to increase further. The HCTF is closely monitoring the open enrollment data. Separately, the University has changed the description of “domestic partner.” There is now only one definition of

domestic partnership, regardless of age or gender. The Senate is responsible for this change. UCAP and UCFW are looking Stop the Clock; it is meant to enhance careers, not be a detriment.

The University is putting together a plan for multi-year budgeting. The Senate strongly supports this, and feels it is very sensible and helps the campuses plan.

- **SSGPDP Concerns**

Guest: Glen Mimura, UCI Faculty Member

The Academic Senate Chair has asked CCGA to be a lead committee on the review of the SSGPDP programs, along with UCPB and UCAP. This is not a review of particular programs. It is attempt to see – as a whole – if SSGPDPs have worked well and lived up to their revenue goals. Also, the Regents are very concerned about diversity, and it is unclear if SSGPDPs are working to address diversity goals in their programs.

Professor Mimura is from UCI, a campus that has a considerable number of SSGPDPs. He said that UCI has been looking at self-supported programs fairly routinely in Graduate Council they have determined that the impact of these programs on the campus is much greater than anticipated. They possibly are having an impact on undergraduate as well as graduate programs. Self-supporting students are on the campus along with regular students, competing for classroom space, impacting parking, and using campus facilities. If three or four units are able to front SSGPDP programs and hire 40 faculty, a significant impact is made on the campus that is not accounted for in academic planning. Engineering and ITS programs in particular are competing with the SSGPDPs. There is a big promise of money, but there has not always been attention to the impact of these programs. Students in the program see themselves as “regular” students – they don’t see themselves as being in a special class – but they do not have access to services that traditional students have. They became a second class citizens within the campus.

Former Chair Duderstadt echoed what Professor Mimura said. She emphasized that the University is missing is a strategic plan for SSGPDPs. There should be a strong effort this year to develop strategic planning for these programs. There is concern that UC is establishing a private university within a public university.

Chair May asked that the committee work assiduously with the other committees to make recommendations regarding the proliferation of SSGPDPs on the campuses.

VI. New Program Proposals

A. Proposal to establish an MA in Global Health on the San Diego Campus

– Lead Reviewer Glen Mimura

This is a program that was reviewed over the summer; consequently, it took some time to get letters of review. The Lead Reviewer has written the proposers several times with the reviewer feedback and has not received a response. Reviewers were split on the proposal: one was positive, one was negative, and two were in the middle. Concerns centered around faculty workload, the professional track, curriculum, and how the program is presenting itself. A response is needed from the campus – they have not responded for a month, despite three emails from the Lead Reviewer. The UCSD representative will reach out to the proposers to find out why they are not responding.

- B. Proposal to establish an MS/PhD in Communication on the Los Angeles Campus
 – *Lead Reviewer Shahrokh Yadegari*
 The Lead Reviewer noted that there are other similar programs within UC, but not many. He experienced great difficulty finding internal reviewers. All the reviews were positive, with some concern about the faculty load.
Action Taken: The proposal was approved 8-0-1.
- C. Proposal to establish a Master of Bioprocess Engineering on the Berkeley Campus [SSGPDP]
 – *Lead Reviewer Teamrat Ghezzehei*
 The Lead Reviewer was not present.
- D. Proposal to establish a MS in Molecular, Cell and Developmental Biology on the Santa Cruz Campus
 – *Lead Reviewer Dyche Mullins*
 Reviewers were largely in support of the program, but a recommendation was made to address the GRE requirement.
Action Taken: The proposal was approved 8-0-1.
- E. Proposal to establish an MS in Biostatistics on the San Diego Campus
 - *Lead Reviewer Karen Duderstadt*
 The Lead Reviewer remarked that the proposal was very well put together and that it had been thoroughly vetted on the campus. Overall, reviewers felt the proposal was very strong and were impressed by faculty that will be participating.
Action Taken: The proposal was approved 8-0-1.
- F. Proposal to establish an Interdepartmental Program in Biophysics for the MA/PhD degrees on the Riverside Campus - *Lead Reviewer Carlson Arnett*
 The Lead Reviewer has secured four reviewers.
- G. Proposal to establish a Masters in Supply Chain and Logistics Management on the Riverside Campus [SSGPDP] - *Lead Reviewer Leroy Westerling*
 The Lead Reviewer is working on securing reviewers.
- H. Proposal to establish a joint Entomology BS/MS Five-Year Combined Degree program on the Riverside Campus - *Lead Reviewer Caroline Streeter*
 The Lead Reviewer is awaiting responses from the reviewers.
- I. Proposal to establish a MS/PhD in Management of Complex Systems at the Merced Campus
 – *Lead Reviewer Onyebuchi Arah*
 The Lead Reviewer had trouble finding reviewers, and went through a dozen people trying to secure them. He eventually got three reviewers and the responses from the proposers were adequate.
Action Taken: The proposal was approved 7-0-2.
- J. Proposal to establish a MFA in Environmental Art and Social Practice at the Santa Cruz Campus
 – *Lead Reviewer Nancy Peluso*
 The Lead Review is working on getting reviewers.
- K. Proposal to establish a Master of Engineering at the Irvine Campus [SSGPDP]
 – *Lead Reviewer Lynn Russell* –
 The Lead Reviewer has approached approximately 12 reviewers and has not yet had one accept.

- L. Proposal to establish a Master of Presentation Design at the Irvine Campus [SSGPDP]
– *Lead Reviewer Hyle Park*
The Lead Reviewer was not present.
- M. Proposal to establish a PhD in Language Science at the Irvine Campus
– *Lead Reviewer Gina Dent*
The Lead Reviewer was not present.
- N. Proposal to establish an MS in Natural Language Processing at the Santa Cruz Campus
– *Lead Reviewer Amr El Abbadi*
The Lead Reviewer has secured four reviewers.
- O. Proposal to establish an Online MBA Program on the Davis Campus [SSGPDP]
– *Lead Reviewer Priya Ranjan*
The Lead Reviewer has one external reviewer and one internal reviewer.
- P. Proposal to establish a Flexible Master of Social Welfare at the Berkeley Campus [SSGPSP]
Action Taken: Ramesh Balasubramaniam was assigned as the Lead Reviewer.
- Q. For Committee Discussion: Change to existing UCI Master of Embedded and Cyber-Physical Systems [SSGPDP]
The Analyst will ask for the materials the UCI Grad Council used in their review of the proposal.

VII. Transfers, Consolidations, Discontinuances, and Discontinuances

- A. Proposal for a “Simple” Name change from Master of Architecture to Master of Advanced Architectural Design at the Berkeley Campus.
Action Taken: The simple name change was approved 7-0-0.

VIII. MRU Reviews

- A. University of California Humanities Research Institute (UCHRI)
Action Taken: Gina Dent was assigned as Lead Reviewer.
- B. Institute for Nuclear and Particle Astrophysics and Cosmology (INPAC)
Action Taken: Ramesh Balasubramaniam was assigned as Lead Reviewer.

IX. For Committee Review and Discussion

- A. Training for Teaching Assistants and Graduate Student Instructors [from UCEP]
Guest: Anne Zanzucchi, UCEP Chair

Ms. Zanzucchi stated that training for TAs and graduate student instructors is highly variable between the campuses. UCEP asked the campuses about best practices and what kind of support is offered to get a sense of what takes place systemwide. They found areas of support that are missing, and brought those forward to Academic Council. The suggested improvements will be discussed at APC tomorrow. One student member added that - as a woman of color - she has students come to her with emotional issues; training around those topics would be very helpful. It was agreed that having some overarching training approach would help everyone.

- B. Proposed Revised Presidential Policy on Sexual Violence and Sexual Harassment
It has been reported that TAs are concerned about being responsible as “reporters” for sexual violence and sexual harassment. There is concern that this might have the effect of discouraging undergraduates from talking to their advisors. There are other offices where students go that do not need to report. Another concern is that the language in the policy is vague. Also, when there is a settlement case, the wording allows for the University to settle with the professor and not inform the injured parties; there is feeling that the injured party should know. Comments should be forwarded to the Chair by November 23.
- C. Proposed Revisions to Presidential Policy on Protection of Administrative Records Containing Personally Identifiable Information
Comments should be forwarded to the Chair by November 23.
- D. Declaration of Principles (Open Access) Document [from UCOLASC]
The Analyst will invite the UCOLASC chair to the next meeting to discuss this topic.
- E. Medical Abortion at UC Student Health Centers and the UC SHIP Insurance Plan [from HCTF]
There was a bill that was put in front of the governor on this issue that was vetoed. The governor said that there was enough support in the areas surrounding the campuses – Reproductive health issues are complicated and time-sensitive issues. This topic will be discussed more fully at the December meeting.

X. Updates from the Campuses

Members shared upcoming program proposals and other items of campus concern/interest.

The meeting adjourned at 3:59.

From: [Karen Mizumoto](#)
To: ["thao.nguyen@uci.edu"](mailto:thao.nguyen@uci.edu); [Michelle V. Nguyen](#)
Cc: [Martha J. Graciano](#); [Fadi J. Kurdahi \(UCI\)](#); [Ahmed Eltawil \(UCI\)](#); [Grace Wu \(UCI\)](#); [Melanie Kilian \(UCI\)](#); [Natalie B. Schonfeld](#); [Kate Brigman](#)
Subject: Budget Office Review of Restructured MECPS SSGPDP Budget
Date: Thursday, June 14, 2018 7:43:34 PM

Dear Thao and Michelle:

The Budget Office has reviewed the proposed revisions to the MECPS budget. The proposed additional quarter and fee change do not appear to have a material impact on the program's overall financial picture. Either way, break-even for the program appears to be around 21-22 students. If they are not able to achieve at least this level of steady-state enrollment, plus a little more to recover start-up costs, the program will struggle either way. It would be ideal if they could achieve enrollment in excess of 30 in a shorter timeframe than proposed, but the budget presented, based assumptions and information provided by MECPS, captures a reasonably conservative estimate.

We have provided some guidance regarding faculty/instructor compensation, noting it may not be practical to expect all instruction to be on overload as the program matures. We noted on-load instruction costs could be a little higher, but also the program may want to consider the use of lecturers for some classes to manage instruction costs should that become a need. For the immediate future, the unit is confident that offload teaching will continue to represent a reasonable instructional budget. After applying an inflationary factor to those projected costs, the Budget Office agrees the current budget plan provides a reasonable representation of anticipated instruction costs.

Regards,

Katherine Gallardo
Director, Strategic Planning
Budget Office

Karen Mizumoto
Campus Student Fee Program Coordinator
Budget Office

October 31, 2018

**ONYEBUCHI ARAH, CHAIR
COORDINATING COMMITTEE ON GRADUATE AFFAIRS**

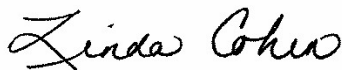
RE: Proposed Modifications to the Master of Embedded and Cyber-Physical Systems

At their October 16, 2018 meeting, the Cabinet unanimously endorsed a proposal to modify the Master of Embedded and Cyber-Physical Systems (MECPS), a joint SSGPDP in the Henry Samueli School of Engineering and the Donald Bren School of Information and Computer Sciences. The proposed modifications include increasing the time-to-degree (from 3 quarters to 5), adding three additional courses (from 9 courses to 12), increasing the unit requirements (from 36 credit hours to 48), and increasing the program cost (from \$30,000 to \$43,000). The Council on Planning and Budget and campus Budget Office reviewed the proposed changes, and the Graduate Council reviewed and approved the proposed changes.

While modifications to approved graduate programs are typically reviewed only at the Divisional level, due to the proposed changes to the program fee, we wanted to make the Coordinating Committee on Graduate Affairs aware of the changes in the event that the Committee would like to conduct an additional review.

If you have any questions, please feel free to contact me.

Sincerely,



Linda Cohen, Chair
Academic Senate, Irvine Division

Enclosures: MECPS proposed modification dated 5/17/2018
Budget Office email dated 6/14/2018
Council on Planning and Budget memo dated 7/13/2018
Graduate Council memo dated 10/15/2018

C: James Steintrager, Chair Elect-Secretary, Academic Senate
Glen Mimura, Chair, Graduate Council
Thao Nguyen, Graduate Council Analyst, Academic Senate
Steve Gross, Chair, Council on Planning and Budget
Michelle Chen, Council on Planning and Budget Analyst, Academic Senate
Laura Gnesda, Senate Analyst, Academic Senate
Kate Brigman, Executive Director, Academic Senate



July 13, 2018

**MARIA PANTELIA, CHAIR
ACADEMIC SENATE, IRVINE DIVISION**

RE: Proposed Modifications to the SSGPDP Master of Embedded and Cyber-Physical Systems

The Council on Planning and Budget received for its review the proposal to modify the Professional Master of Embedded and Cyber-Physical systems.

In response to student concerns regarding the program's short duration, the modifications include increasing the time-to-degree from 3 quarters to 5 quarters (including summer), adding three courses, increasing unit requirements from 36 credit hours to 48 credit hours, and increasing the cost from \$30,000 to \$43,000.

In terms of budgetary issues, the Council did not observe anything significantly problematic. The proposers included an assessment from the Office of Planning and Budget that confirms the financial viability of the program modification. The Budget Office noted, "The proposed additional quarter and fee change do not appear to have a material impact on the program's overall financial picture."

There is minor concern that the proposers do not adequately consider the costs associated with internships. The proposal states that the program will "assist students to find internships but will not guarantee an internship." Though the proposal indicates that the student is responsible for obtaining an internship, the Council encourages the proposers to consider this issue more deeply.

CPB appreciates the opportunity to comment.

On behalf of the Council,



Steven Gross, Chair

CC: Natalie Schonfeld, Executive Director
Laura Gnesda, Council Analyst
Michelle Nguyen, CPB Analyst



October 15, 2018

**LINDA COHEN, CHAIR
ACADEMIC SENATE, IRVINE DIVISION**

**RE: Program Modification – Master of Embedded and Cyber-Physical Systems (SSGPDP) –
Final Review**

At its October 11, 2018 meeting, Graduate Council continued the review of the program modification submitted by the Master of Embedded and Cyber-Physical Systems (MECPS), a joint SSGPDP in the Henry Samueli School of Engineering and the Donald Bren School of Information and Computer Sciences. Graduate Council considered the July 13, 2018 memo from the Council on Planning and Budget (CPB) and the June 14, 2018 email correspondence from the Office of Planning and Budget, endorsing the proposed modification.

The proposed modification consists of the following:

- Time to degree: Increased from 3 quarters to 5 quarters
- Course Requirements: Adding three additional courses (from 9 courses to 12 courses)
- Unit Requirements: Increased from 36 credit hours to 48 credit hours
- Cost: Increased from \$30,000 to \$43,000

Approval

At its June 14, 2018 meeting, Graduate Council has previously approved the program modification based on its academic merits, pending endorsement by CPB and the Office of Planning and Budget. With positive endorsement in place, Graduate Council reaffirms its position of approving the program modification and shares CPB's concern regarding internship for MECPS students.

On behalf of the Graduate Council,



Glen Mimura, Chair



- c: Celina Mojica, Director of Postdoctoral Affairs, Graduate Division
- Aliya Thomas, University Editor
- Kate Brigman, Executive Director
- Steven Gross, CPB Chair
- Michelle Chen, CPB Analyst
- Thao Nguyen, Graduate Council Analyst



May 17th, 2018

To: Graduate Council

FROM: Ahmed M. Eltawil
Interim Director, Master of Embedded and Cyber Physical Systems
Professor, Electrical Engineering and Computer Science Department

RE: Request for degree modification.

This cover letter and the accompanying form constitute a request to modify the Professional Master of Embedded and Cyber-Physical systems. The scope of changes includes changing the time to degree, course requirements, unit requirements, and cost.

Time-to-degree: Increased from 3 quarters to 5 quarters (4 + summer)

Course Requirements: Adding three additional courses. (increased from 9 courses to 12)

Unit Requirements: Increased from 36 credit hours to 48 credit hours.

Cost: \$43,000 (increased from \$30,000)

Rationale for request: A significant amount of time has elapsed since the program was first conceived. The MECPS degree program was initially submitted in May 2014 and approved in December 2016. The first cohort enrolled in fall 2017 and is due for graduation in Spring 2018. The original rationale of having a short 9 month academic program was to allow students to have rigorous and focused academic training that allows them to join the workforce in a short time after graduation. Initial market studies performed in March 2014 seemed to affirm both the choice of duration and cost.

With the program officially released, it became rapidly clear that the short duration of the program is a deterrent to application especially for international students, who form the bulk of program enrollees. Students and applicants are concerned for the following reasons:

1. Students are concerned that the short duration and intensity of the program will affect their ability to learn and achieve high GPA, thus negatively impacting their ability to secure jobs in the field.
2. Students cited that not having a summer quarter limits their ability to intern in industry, which negatively impacts their industrial experience and job prospects.

These student opinions were gathered from applicant inquiries for the 2017/18 and 2018/19 application cycles, as well as discussions with the current cohort of students. The executive committee¹ of the program met on February 20th and again on April 25th to discuss the DMF modification, resulting in the current format of the proposed changes. A townhall was held with current students on May 3rd to formally survey their opinions with results summarized later in this letter.

Changes to program: The original plan of study called for nine courses over three quarters as shown in Figure 1. The proposed plan of study increases the duration to 5 quarters (including summer) with 12 required courses as shown in Figure 2. Changes can be summarized as follows:

- 1- **Course additions:** We propose adding the following three courses to the program:
 - ECPS 211 Fundamentals of Machine Learning and Artificial Intelligence (Winter)
 - ECPS 212 Entrepreneurship for Scientists and Engineers (Fall 2)
 - ECPS 210 Project increased from 4 credits to 8 credits (Fall 2)

¹ Executive committee members are Professor Rainer Doemer, Professor Eli Bozorgzadeh, Professor Mohammad AlFaruque, Professor Ahmed Eltawil and Professor Fadi Kurdahi.



- 2- **Summer:** ideally students will secure an internship over summer. The program will assist students to find internships but will not guarantee an internship. If the student cannot secure an internship, Summer can be used to start background work on graduation project, since selection of project will be performed as part of the CPS case studies course in Spring and students will know what their final project is and who the advisor will be.
- 3- **Modify offering quarter:** CPS case studies moved from Winter to Spring.

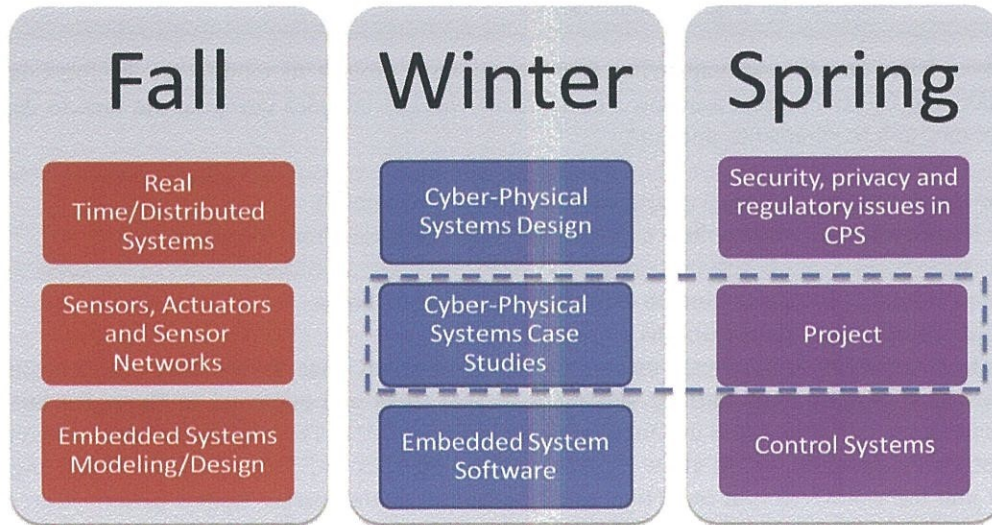


Figure 1 Original plan of study

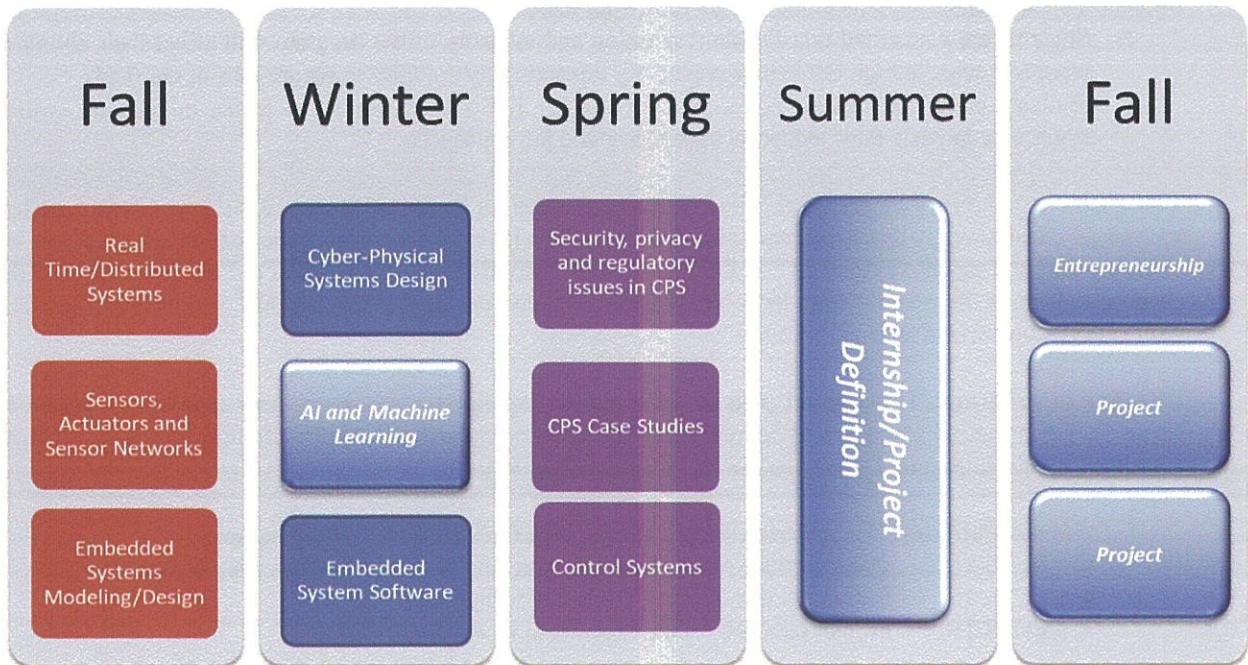


Figure 2 Proposed plan of study



Proposed course contents (See attached outlines):

- ECPS 212 Entrepreneurship for Scientists and Engineers
 - Technology entrepreneur
 - Building a business plan and presentation: reasons, form, and content
 - Identifying a business idea opportunity
 - Building a competitive advantage
 - Business innovation strategies
 - Core competencies and outsourcing strategy
 - Marketing and sales plan
 - Leadership of entrepreneurial organizations
 - Legal formation of a company and intellectual property
 - Sources of capital funding for start-ups
 - Exit strategies for investors
- ECPS 211 Fundamentals of Machine Learning and Artificial Intelligence
 - The study of theories and computational models for systems which behave and act in an intelligent manner. Fundamental subdisciplines of artificial intelligence including knowledge representation, search, deduction, planning, probabilistic reasoning, natural language parsing and comprehension, knowledge-based systems, and learning.

Student Feedback

Emails and inquiries from applicants: A large majority of applicants to the program had concerns regarding the duration of the program. Excerpts of emails included the following:

- “Thank you for your email. I feel very excited when I received this email and knew that I have been accepted by the master of embedded and cyber physical systems of UCI. UCI is one of the schools that I want to go most. However, I have some questions about this one year program. I read the program information on the website carefully and realized that I need to finish 36 units in one year. I think the workload may be kind of heavy, and I feel a little stressful. Would that be possible if I extend this program from one year to one year and a half, so that I will have more time to learn the courses and can possible find a summer internship during the program ? And are there any extra preparations that I need to do before I join in this program ?”
- “I just wanted to enquire if the course on MECPS is stem accredited or not? And since the program is only for one year what are my options after completion of course ?”
- “Why aren't we allowed to do internships during our course?”

Town hall with current cohort of students: The proposed changes to the program were presented in a townhall style meeting with the current cohort of students on May 3rd followed by a survey. 100% of the students agreed with increasing the duration of the program (27% agree, 73% strongly agree). 100% agreed to adding ECPS211 course (18% agree, 82% strongly agree). 73% agreed to adding ECPS212 course (55% strongly agree, 18% agree, 9% disagree, 18% no opinion).

Cost

The proposed cost for the program will be \$43,000. This is in line with other self-supporting programs on campus such as the Master for Computer Science, which is of similar duration.

Conclusion

Based on the feedback collected over the past year, the executive committee strongly feels that the changes proposed in this Degree Modification Form will significantly enhance the program and improve placement for program graduates.



Office of the Academic Senate

Request Form to Modify Graduate Degree Requirements

Graduate Program Name & Degree	Professional Master of Embedded and Cyber-Physical Systems (MECPS)
Department	Center for Embedded and Cyber Physical Systems
School	Joint between HSSoE and DBSICS

Prepared by: Ahmed M. Eltawil Telephone: 949-824-0125 E-Mail: aeltawil@uci.edu

Faculty Contact: Ahmed M. Eltawil Telephone: 949-824-0125 E-Mail: aeltawil@uci.edu

Proposed effective date of graduate degree modification(s): Fall 2019

Proposed Modification(s)(please check all that apply)

- Admission requirements
- Course requirements
- Unit requirements
- Examination requirements
- Time-to-degree
- Other (please describe) Fees

1. In a cover letter addressed to Graduate Council from the Department Chair or Program Director (as appropriate), briefly describe the proposed modifications and provide a justification for the request.

2. Existing Program Requirements Proposed Revisions

*The information copied and pasted here should come directly from the Catalogue <http://catalogue.uci.edu/informationforprospectivestudents/undergraduatandgraduatedegrees/>

Existing	Proposed: Underline the additions and strike the deletions.
ECPS 202 Cyber-Physical Systems Design	ECPS 202 Cyber-Physical Systems Design
ECPS 203 Embedded Systems Modeling and Design	ECPS 203 Embedded Systems Modeling and Design
ECPS 204 Embedded System Software	ECPS 204 Embedded System Software
ECPS 205 Sensors, Actuators and Sensor Networks	ECPS 205 Sensors, Actuators and Sensor Networks



Office of the Academic Senate

<p>ECPS 206 Real-Time and Distributed Systems ECPS 207 Security and Privacy in Cyber-Physical Systems ECPS 208 Control Systems for Cyber-Physical Systems B. Complete the following case studies course: ECPS 209 Cyber-Physical Systems Case Studies C. Complete the following project course: ECPS 210 Cyber-Physical Systems Project</p>	<p>ECPS 206 Real-Time and Distributed Systems ECPS 207 Security and Privacy in Cyber-Physical Systems ECPS 208 Control Systems for Cyber-Physical Systems B. Complete the following case studies course: <u>ECPS 211 Fundamentals of Machine Learning and Artificial Intelligence</u> <u>ECPS 212 Entrepreneurship for Scientists and Engineers</u> ECPS 209 Cyber-Physical Systems Case Studies C. Complete the following project course: ECPS 210 Cyber-Physical Systems Project</p>
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3. **Relationship to competitive programs:** Program will be of equal length in terms of time to graduation as other competitive programs on campus such as Professional Master of Computer Science or Master of Human-Computer Interaction & Design Program.
4. **Impact on Time to Degree:** Proposed program will be 5 quarters (4 quarters + summer) versus 3 quarters as currently offered.
5. **Expected impact on quality of the program:** Based on feedback from current cohort of students as well as the executive committee, the added courses and increased length of program will provide students more opportunities for academic training and improved industry engagement via internship opportunities that are not possible under the current structure.
6. **Expected impact on employment prospects:** Employment prospects will improve due to the following reasons:
 - 1- Internship opportunities right before engaging in the final project will allow students to gain valuable industry experience, thus making the project more relevant.
 - 2- In the case that a student does not secure an internship in summer, the extended period (Summer + Fall) over which the student can work on the project will lead to an enhanced and more in-depth project, in turn, improving employment prospects.
 - 3- Adding two extra courses enhances the students' academic standing. While one of the courses will be purely academic (ECPS211), the second course will provide students with necessary breath to understand how companies operate with a focus on

Senate Form updated 10/10/2017



Office of the Academic Senate

entrepreneurship (ECPS 212). Students will be better prepared to join industry with a good understanding of both the academic challenges as well as the business eco-system.

7. Expected impact on recruitment: The current cohort of students were surveyed regarding the proposed changes. 100% of the students agreed with increasing the duration of the program (27% agree, 73% strongly agree). 100% agreed to adding ECPS211 course (18% agree, 82% strongly agree). 73% agreed to adding ECPS212 course (55% strongly agree, 18% agree, 9% disagree, 18% no opinion).

Thus based on a) current student feedback, b) executive committee discussions, c) emails and questions from applicants, and d) comparable programs both across campus and at other universities, we believe that the proposed changes will have significant impact on recruitment.

8. Will current students be permitted to switch to take advantage of the revisions? If so, what will be the approval process?

No. Since currently MECPS is a one-year, 3 quarter, program, there will be no overlap between graduating cohorts and newly admitted cohorts.

9. Faculty vote – Include all information below

Total number of eligible faculty: 11

Total number of voting faculty: 8

For	8
Against	0
Abstain	0

Date of vote: 5/23/2018

*Note, completing this section accurately is of particular importance so that we can determine if there was quorum for the faculty vote. Each School’s bylaws should indicate their rules on quorum. If no specifics are listed we default to Robert’s Rules of Order which is 50% +1. To view what each Schools bylaws are visit the Senate Manual and see Part III, Appendix I: Bylaws of the Faculties http://senate.uci.edu/uci-academic-senate-manual/

Required Signatures (as appropriate: Director or Chair and Associate Dean or Dean)

Program Director	<u>Ahmed Eltawil</u> Print Name	<u></u> Signature	<u>5/23/2018</u> Date
Department Chair	<u>Fadi Kurdahi</u> Print Name	<u></u> Signature	<u>5/23/2018</u> Date



Office of the Academic Senate

Associate Dean	_____	_____	_____
	Print Name	Signature	Date
Dean	<u>Frances Leslie</u>	<u>Frances Leslie</u>	<u>5/24/18</u>
	Print Name	Signature	Date

Required Appendices:

- A. Copy of Bylaws used for Faculty vote (e.g. either School, Department or Program)
- B. Revised and Dated Program Summary
- C. Revised Catalogue Copy
- D. Print out of CIM proposed revisions, if applicable
 - a. (*See instructions below)
 Go to the Registrar’s online Course Inventory Management (CIM) System (https://login.uci.edu/ucinetid/webauth?return_url=https://shib.nacs.uci.edu/idp/Authn/RemoteUser) to revise, create and delete courses. Submit the revisions online and submit the print out of those proposed modifications sent through the CIM system.

Optional Appendix:

- A. Additional Letter(s) of Support from Associate Dean of Graduate Studies or Dean

Submit the completed form in one single pdf with all materials, signatures and dates to Natalie Schonfeld at nschonfe@uci.edu

****Items submitted incomplete and or in piecemeal will not be accepted for review. Please note Graduate Council meeting dates and their corresponding item submission deadline dates.***

To be filled out by the Academic Senate:

Date completed form is submitted: _____

Reviewed by Graduate Council: _____

Approved by Graduate Council: _____

Appendix A

BY-LAWS

OF THE FACULTY OF GRADUATE PROGRAM IN EMBEDDED & CYBER-PHYSICAL SYSTEMS

Article I. Purpose

The primary goal of the Graduate Program in Embedded and Cyber-Physical Systems (henceforth referred to as “the Program”) is to administer the interdisciplinary graduate program of instruction and research leading to graduate degrees in Embedded & Cyber-Physical Systems in accordance with the rules of the Graduate Division of the University of California, Irvine. The Program shall be administered by the Center for Embedded Computer Systems and will report to the Dean of Graduate Studies. Since the faculty who are involved in Embedded & Cyber-Physical Systems and related research are distributed over several Schools, ORUs and Programs, this affiliation will also serve to facilitate interaction to encourage joint research, seminars, and teaching.

Article II. Membership

Membership in the Program Faculty shall be open to all UCI faculty who are actively engaged in research in cyber-physical and/or embedded systems or related areas and who shall be deemed qualified by University regulations and by vote of the Executive Committee.

Anyone desiring to become a member of the Program Faculty may submit an application to the Program Director listing his/her qualifications and stating the reasons for wishing to become a member. These Applicants will be evaluated in terms of their current research interests and teaching commitments, and their potential for graduate student guidance and contribution to the Group's course offerings. The application will be acted upon by the Executive Committee.

Membership on the Program Faculty shall be reviewed annually by the Executive Committee. Program Faculty must participate in seminars, serve on graduate student committees, provide research support to graduate students, and/or teach regular courses germane to the Group's educational activities or be subject to removal. Faculty with less active roles may be listed as Affiliated Faculty by the Executive Committee.

Article III. Administration: Director, Committees, Responsibilities and Oversight

The Program will establish a Director. The Director will be the administrator of the program and will serve a three year term.

The Executive Committee shall manage the affairs of the Program Faculty. The Committee comprises five members including the Director of the graduate program in Embedded & Cyber-Physical Systems (who shall serve as Chair of the Committee.), the Director of the Center for Embedded Systems, and three general members elected by the Program Faculty. Committee members serve a two-year term. Election is by a mail ballot at least three weeks before the end of spring quarter, and newly elected members assume their duties on July 1. Vacancies shall be filled by appointment made by the existing Committee; appointed members serve until the next election. To insure broad participation, no more than two general members shall be from any one academic department.

The principle responsibilities of the Executive Committee are: 1) to represent the Program Faculty in official matters, both inside and outside the University; 2) to conduct administrative and clerical matters related to activities of the Program Faculty; 3) to review membership in the Program Faculty and maintain the Program Faculty's level of activity; 4) to review and modify program requirements from time to time; and 5) to make recommendations for admission to the graduate program. The principle role of the Graduate Advisor is the coordination of graduate affairs and the graduate application process, and the appointment of initial faculty advisors for students in the program. The Graduate Advisor reports to the Director of the program.

For the inaugural term, the founding group of faculty proposing the program will form the interim Executive Committee and Professor Fadi Kurdahi will serve as the interim Director. Once the degree program is officially approved, the nomination process outlined in the following section will be followed to confirm or replace the interim Director and Executive committee for the inaugural and all subsequent terms.

The nomination process of a new Director will be conducted in accordance with current Graduate Council and Academic Personnel Manual policies, APM Section 245. <http://www.ucop.edu/acadadv/acadpers/apm/apm-245.pdf>. A "Nominating Committee" should be named by the Executive Committee or current Director to solicit from the faculty and graduate students of the Program the names of nominees for Program Director. The names of the nominees indicating a willingness to serve will then be submitted to the Program's faculty and graduate students for comments. These names will then be forwarded for comment to the Deans of the HSSoE and DBSICS. All comments will remain confidential.

The Deans will submit up to two names to the Dean of Graduate Studies along with comments received on the nominees. The Program and/or Deans may express a preference and, if so, should indicate the basis for that preference. After interviewing the nominees the Dean of Graduate Studies will forward his

or her choice to the Deans and the Program. The normal tenure of a Director is three years; however, a Director may choose to serve a shorter term. Directors may be appointed to serve one or more terms thereafter.

The Graduate Committee oversees admissions, curriculum, and criteria for advancement of students, graduate advising, and financial support, among other things. The members of the Committee shall select a Graduate Advisor from their ranks to serve for a two year term of office. The Program Chair and the Graduate Advisor positions may be combined at the discretion of the Committee.

Article IV. Meetings

Meetings are called by the Chair as he/she deems necessary, or at the request of the Executive Committee, or upon written notice from five or more members of the Program Faculty. There shall be at least one meeting per year. The program Director may call a special meeting of the program as she or he or the Executive Committee deems necessary or desirable. Additional meetings can be petitioned by five or more members. Meetings shall be conducted in accordance with generally accepted procedures including reading of the minutes of the previous meeting, report of the Executive Committee, unfinished business, and new business. At meetings, 50 percent of the Program Faculty membership shall constitute a quorum which will be empowered to take any action during the meetings except for changes in these by-laws. Minutes will be distributed to all Program faculty and instructors promptly after each meeting.

Article V. Student Representatives

Upon the recommendation of appropriate student groups, the Executive Committee may consider student representatives to sit on relevant committees as so deemed by the Committee. The student will have voting privileges regarding issues related to the academic program. However, the student representative may not be present during any collective bargaining issue or concern regarding faculty and instructors personnel matters and, and, hence, will not have voting privileges with respect to these matters.

Article VI. Graduate Student Advising

The Graduate Committee will ensure that all matriculation and student advancement are done in accordance with UCI policy. As such, the Program acknowledges the Dean of Graduate Studies by the authority of the Graduate Council has final authority to approve appointments to graduate student advancement and dissertation committees. The appointments originate with the faculty and instructors mentor and student, and are submitted to the Dean of Graduate Studies via the program's Graduate Advisor and the program Director. A fully developed Graduate Student Handbook to whom students can consult for any information or to seek a solution to academic Problems will be made available. The Graduate Advisor will serve as the program's representative in dealing with the Office of Graduate Studies It is expected there will be sufficient advisors to assist students in their progress to the MS in EM.

Article VII. Order of Business

All meetings of the Faculty shall be governed by procedures specified in UC Academic Senate Bylaw 162

Article VIII. Amendments and Suspension of Rules

Changes in these bylaws shall be made by: (A) approval of at least two-thirds of the Program Membership, by email vote, or (B) at a meeting, (provided that notice of such proposed changes shall have been sent to the Members at least one week prior to the date of voting). Any significant amendments and revisions to the rules or bylaws will be submitted to Graduate Council for review and approval. Passage of amendments to bylaws must satisfy the Program's quorum rules. The rules of the Faculty and instructors may be suspended by vote of the Faculty and instructors provided that not more than two voting members present an objection to such suspension. The Program Chair will always state the question as follows: "Those who object to a suspension of the rules will raise the right hand". Both the duration and nature of the suspension will be explicitly stated before the votes are cast.

Graduate Degree Program Summary

Date: December 13, 2016 – Modified May 23, 2018

Degree Program: Master of Embedded & Cyber-Physical Systems

Degree Objective: Master of Embedded & Cyber-Physical Systems

Degree (Diploma) Title: Master of Embedded & Cyber-Physical Systems

Degree Concentration: N/A

Degree Program Code: OCO (zero-C-O)

Specialization or Emphasis: N/A

Academic Unit: This is an interdisciplinary graduate program. The Graduate Dean serves as the reporting Dean for academic affairs.

Date Authorized: December 13, 2016

Last Updated: N/A

Last Program Review: new program

Normative Time: One year. Maximum time to degree is two years.

Application Deadlines: January 15th is the preferred deadline for submission of applications with rolling applications accepted until March 15th.

Admission Requirements: Potential graduate students for the MECPS Program apply through the Office of Graduate Division and indicate on their applications their interest in the Program. Applicants are expected to hold a Bachelor's degree in Computer Engineering, Computer Science or Electrical Engineering. Students from other disciplines may be considered for admission if they have sufficient background in the basics of embedded systems. Applicants will be evaluated on the basis of their prior academic record and their potential for carrying out graduate level work as demonstrated in submitted application materials. These materials will include official university transcripts, letters of recommendation, GRE scores, and Statement of Purpose. Of particular interest are students whose background is in one of the target application areas of CPS (e.g. mechanical engineering, civil, biomedical, etc.). Students with some industry experience will be considered favorably, especially if their experience is relevant to the areas emphasized by CPS. An admissions committee composed of senate faculty members evaluate applicant files and make admissions decisions based on the overall file presented by the student.

Advising: The CPS Program director will assign an advisor to all incoming students based on their areas of interest and after consultation with key faculty members. The aim in assigning advisors to students

will be to make the best match possible so students can fully benefit from their educational experience at UCI.

Residence Requirement: Students will be enrolled for 5 quarters, including summer.

Language/Alternate Skills Requirement: There are no formal foreign language requirements for the proposed degree program. Engineering and CS are areas where English is the predominant language of technology. Thus we do not anticipate a foreign language requirement formally, but practically this is much less of an issue as over 80% of our applicant pool are international students.

Teaching Requirement: There is no teaching requirement for this program.

Coursework and Examination Requirements: 36 48 units are required. The eleven required courses are explained below.

Seven Nine Core Courses:

CPS 202: Cyber-Physical Systems Design

CPS 203: Embedded Systems Modeling/Design

CPS 204: Embedded Systems Software

CPS 205: Sensors, Actuators, and Sensor Networks

CPS 206: Real-Time/Distributed Systems

CPS 207: Security and Privacy Issues in CPS

CPS 208: Control Systems

ECPS 211: Fundamentals of Machine Learning and Artificial Intelligence

ECPS 212: Entrepreneurship for Scientists and Engineers

One Case studies course, CPS 209: Cyber-Physical Systems Case Studies. In this course, students will elaborate in one of the applications areas of CPS. The course will be conducted in a seminar-like model and will serve as the first step towards their graduation project.

One Project Course, CS 210: Cyber-Physical Systems Project. Students are required to complete a project that deals with a specific emphasis of Embedded and Cyber-physical systems. The project will be mentored by a faculty member and approved by the student's advisor and the CPS Program director. A project report must be submitted in partial fulfillment of the degree requirements. The project report needs to be approved by the mentor, the student's advisor and the director of the ECPS Program.

Required Courses, Elective Courses: As noted above, there are nine required courses. There are no elective courses.

Advancement to Candidacy: Students will need to file for advancement to candidacy at least one quarter prior to graduation, in accordance with Graduate Division policies.

M.S. Plan I Thesis: N/A

M.S. Plan II Comprehensive Exam: The Master Degree in ECPS is a plan II program requiring a project by the students.

Dissertation: N/A

Graduate Program in Embedded & Cyber-Physical Systems

949-824 -0125

Ahmed Eltawil, Interim Director

The graduate program in Embedded & Cyber-Physical Systems is administered by faculty from two academic units: the Donald Bren School of Information and Computer Sciences, and the Henry Samueli School of Engineering. The program offers the Masters of Embedded & Cyber-Physical Systems degree.

Embedded systems are now entrenched into almost every aspect of our daily life, rivaling in ubiquity anything that exists today. Currently, we have tools to help us design embedded systems, making good use of available technologies at a variety of levels and scales, from hardware to interface, operating system, middleware, and software. Cyber Physical Systems (CPS) are systems-of-systems that tightly couple their cyber (i.e. computation, communication and control), and physical components (sensing and actuation) in the context of applications such as (but not limited to): automotive and transportation, manufacturing, power distribution grid, medical and healthcare, robotics, civil infrastructure, avionics, etc.. Thus, these Cyber Physical Systems marry knowledge from the fields of embedded systems, networking, sensors, real-time systems and control as well as domain-specific knowledge to realize systems that are of untapped complexity and scale. The Embedded and Cyber-Physical Systems (ECPS) program's goal is to train students in the foundation, skills and practices of embedded and cyber-physical systems design, optimization and evaluation. ECPS draws primarily from Computer Science and from Engineering. At UCI, these areas are housed in two Schools: ICS and Engineering.

Admission

Potential graduate students for the MECPS Program will apply through the Office of Graduate Division and indicate on their applications their interest in the Program. Applicants are expected to hold a Bachelor's degree in Computer Engineering, Computer Science or Electrical Engineering. Thus, the program will draw applicants from the EECS and CS departments in HSSoE and DBICS, respectively. Students from other disciplines may be considered for admission if they have sufficient background in the basics of embedded systems. Applicants will be evaluated on the basis of their prior academic record and their potential for carrying out graduate level work as demonstrated in submitted application materials. These materials will include official university transcripts, letters of recommendation, GRE scores, and Statement of Purpose. Of particular interest are students whose background is in one of the

Overall, students will be admitted using criteria similar to those used in traditional MS degrees from relevant departments (EECS and CS).

Master of Embedded & Cyber-Physical Systems Program

~~36~~ 48 units are required. The nine required courses are as follows:

~~Seven~~ Nine Core Courses:

CPS 202: Cyber-Physical Systems Design

CPS 203: Embedded Systems Modeling/Design

CPS 204: Embedded Systems Software

CPS 205: Sensors, Actuators, and Sensor Networks

CPS 206: Real-Time/Distributed Systems

CPS 207: Security and Privacy Issues in CPS

CPS 208: Control Systems

ECPS 211: Fundamentals of Machine Learning and Artificial Intelligence

ECPS 212: Entrepreneurship for Scientists and Engineers

One Case studies course, CPS 209: Cyber-Physical Systems Case Studies. In this course, students will elaborate in one of the applications areas of CPS. The course will be conducted in a seminar-like model and will serve as the first step towards their graduation project.

One Project Course, CS 210: Cyber-Physical Systems Project. Students are required to complete a project that deals with a specific emphasis of Embedded and Cyber-physical systems. The project will be mentored by a faculty member and approved by the student's advisor and the CPS Program director. A project report must be submitted in partial fulfillment of the degree requirements. The project report needs to be approved by the mentor, the student's advisor and the director of the ECPS Program.