

**Office of the President
California State University, Chico**



Executive Memorandum 19-015

May 13, 2019

From: Gayle E. Hutchinson, President

Subject: Suspension of the Master of Science in Electrical and Computer Engineering

Upon the recommendation of the Academic Senate and the concurrence of the Provost, I approve the Suspension of the Master of Science in Electrical and Computer Engineering, effective immediately.

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| Policy Title: | EM 19-015 Suspension of the Master of Science in Electrical and Computer Engineering |
| Contact: | Department of Electrical and Computer Engineering |
| Supersedes: | |
| Revision: | |
| Enabling Legislation or Executive Order: | |

Program Name: Master of Science in Electrical & Computer Engineering (MS ECE) program

Brief rationale for suspension: (attach additional pages if more space is needed):

In recent years, our department has struggled to maintain the MS ECE program while continuing to support the increasing demands of our growing undergraduate programs in the college:

- **The department presently has 10 FTEF and is responsible for 2 undergraduate degree programs as well as the graduate program.**
- **The undergraduate EECE population has steadily increased since 2012 and now totals 282 students, an increase of more than 50%.**
- **Another significant impact on the EECE department has been the increase in students in the majors in which we offer service courses over the same period of time. This includes courses in (a) Computer Science (+284 students, an increase of +95%), (b) Mechanical Engineering (+125 students, an increase of +40%), and (c) Mechatronic Engineering (+65 students, an increase of +46%).**
- **At the same time, the department recognized the need to identify and address the underlying issues in the undergraduate programs related to retention and graduation rates, requiring even more faculty time and attention.**
- **These factors put a strain on the department to continue to adequately support the graduate program. For example, our ability to supervise design projects and research theses was compromised. And in the past three years, several graduate courses, including core courses were cancelled to allow faculty to support the additional undergraduate courses.**
- **Unfortunately, this measure was not enough to allow us to successfully balance the demands of both the undergraduate and graduate programs. We saw that we were undermining the quality and effectiveness of our graduate program, and yet we still needed more faculty time and effort to solve our undergraduate program demands and issues.**

In recent years, faculty turnover and changes in technology and industry expectations have made it imperative that the department significantly revamp its graduate program:

- **The department has experienced considerable turn-over due to the retirements, resignation, and death of several experienced faculty members. Only three of the current department faculty members (one now on FERP) were employed by CSU Chico in 2012.**

- Some of the faculty lines have been filled by, largely, untenured faculty whose areas of expertise differ from the expertise of departed faculty. The new faculty struggle to cover the existing graduate courses with the same technological breadth that has been offered since the last program revisions, which occurred sometime before 2012.
- And, while the composition of the EECE faculty has changed dramatically so has the technologies that industry expects Electrical and Computer Engineering graduate students to master. Yet, the MS ECE curriculum has remained essentially unchanged.
- Thus, EECE department recognizes that our MS ECE curriculum must be radically revised to adapt to include courses that leverage the new faculty expertise and new technologies.
- The curriculum must be revised to provide students with the knowledge and hands-on experience in the areas that are critical to our industry and to remove courses that are no longer technologically relevant.
- The timeline to revise the curriculum must take into consideration that much of the time and attention of our five assistant professors is devoted to developing their teaching methodologies and establishing their scholarly and research activities.
- In addition, these faculty members, as well as our 2 associate professors, are actively pursuing grant opportunities; several have recently obtained funding that included academic release time. The funded release time is equivalent to 0.75 FTE per semester for the next four years, and it is anticipated that faculty release time will increase.
- The department recognizes that a strong portfolio of funded research will benefit both our undergraduate and graduate programs. However, providing our faculty with sufficient time to continue to develop their research and scholarly activities has decreased the faculty time available to participate in the MS ECE curriculum reform, continue to teach and mentor our master's students, while at the same time offering high quality undergraduate programs in computer engineering and electrical engineering, and supporting efforts to improve the retention and graduation rates.
- The department must make necessary changes in the undergraduate program to address the goals of GI 2025 and the revised student outcomes of our accreditation organization, ABET, which must be assessed beginning in AY 2019-2020. Given our current level of staffing, the department has focused its attention to updating and improving our undergraduate programs, which have not undergone a major revision since AY 2014-2015.

Suspend Graduate Program: See EM 13-057

The suspension of the Master of Science program will provide an opportunity for the faculty to develop and begin to implement both the necessary changes to our undergraduate programs, and develop a plan for a high quality MS ECE program that will enhance the reputation of the EECE Department, the College, and CSU, Chico.

In short, to completely overhaul our graduate program, while maintaining the continuity of the degree program, and balancing the demands of our undergraduate education obligations, stretches our resources beyond the limit. We feel we must suspend the program in order to have the resources to successfully revamp it.

Required Signatures

The Department of Electrical and Computer Engineering _____
has reviewed and approved this program suspension.



Chair, Department Curriculum Committee

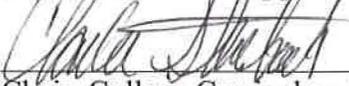
2/7/2019
Date



Department Chair

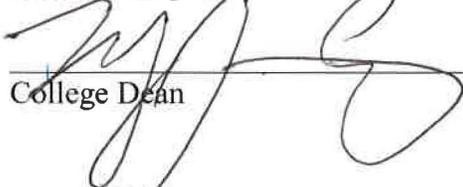
2/7/2019
Date

The College of Engineering, Computer Science, and Construction Management _____
has reviewed and approved this program suspension.



Chair, College Curriculum Committee

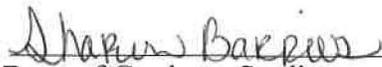
11 Feb 2019
Date



College Dean

2/12/19
Date

The Office of Graduate Studies has reviewed and approved this suspension



Dean of Graduate Studies

2/12/19
Date

Send signature page with proposal attached to Curriculum Services at zip 128

Note: As stated in EM 13-057: Suspension of an Academic Program is used when an academic program needs to be examined, strengthened, and/or modified in order to effectively serve students. Suspension of a program follows a different process and has different goals from Discontinuation of Programs. Program discontinuance should be proposed when a program is not viable or a plan for improvement has failed. While Suspension of a program is temporary, Discontinuation of a program is permanent. (See Guidelines for Discontinuing Programs, EM) The proposal to suspend will be submitted to EPPC for approval. EPPC will notify the Provost of its recommendations. Upon approval of the program suspension, notice that the program has been suspended will be sent to students, advisors, units, and agencies involved in advising or providing information regarding programs on this campus.

[15-005](#) and Guidelines for Budget-Induced Academic Program Elimination, [EM 93-017](#), AS Resolution 2596-03.)

Attach additional pages as needed to answer the following questions:

1. Describe areas of concern as they pertain to the proposed suspension:

The following areas of concern are:

- **The EECE faculty must focus efforts on revisions to the undergraduate curricula and to take other actions to support the graduation initiative GI 2025 and address the changes in the ABET accreditation criteria.**
 - **The average 4 year graduation rate from our two programs is ~ 12%. Two EECE faculty with MMEM and CSCI faculty plan to offer a math/engineering summer bootcamp for incoming freshman and transfer students and are evaluating the possibility of a Winter workshop.**
 - **Other faculty are considering offering online lower division courses that our transfer students do not, in general, take at community and junior colleges.**
 - **The department is about to launch a recruitment activity to build the reputation of the undergraduate programs to attract students with a stronger background in mathematics, a key foundation required for many of our courses.**
 - **The revisions in the ABET student outcome criterion will necessitate major adjustments to our assessment process, which will trigger changes in a number of courses to insure that specified topics are covered in sufficient depth and learning is reinforced.**
- **In the past, our recruitment efforts were not wholly successful in attracting significant numbers of qualified graduate students; the result was that many of the applicants to the MS ECE program did not have adequate preparation to engage in graduate studies. Recently, the the Office of International Education has begun to engage agents to support recruitment of appropriately qualified international students, which should help to address this issue.**
- **In addition, there was little university, college, or department attention or resources paid to recruiting US-based students, non-California residents, and foreign nationals who are attending other institutions. These types of students would bring a greater diversity, balance, and strength to our program. Discussions with the Office of International Education, Graduate Studies, and the College to expand this recruitment effort are in the beginning stages.**
- **Fortunately, enrollment in the MS ECE program is very responsive to recruitment efforts. For example, there was a recruitment initiative in 2014-2015, which resulted in a peak in the MS ECE population of 44 students in AY 2015-2016. As recruitment efforts slowed in subsequent years, student enrollment halved by AY 2017-2018.**

- Clearly, recruitment efforts to improve the quality of our students are imperative to our program's success. Our recent experience reveals that considerable effort has been required to advise our current graduate students. A high percentage of students were required to take remedial coursework and/or have been placed on academic probation. Thirty percent of our MS ECE students were placed on academic probation following a review of their performance in AY 2017-2018. This percentage of MS ECE students on academic probation is similar to the percentages that were placed on probation in recent years, and indicates a pattern of student struggle due to academic unpreparedness.
- More active recruitment in the US and overseas, supported by an updated curriculum and laboratory facilities, should attract more qualified students into the program. In addition, other measures requiring additional faculty time and effort, such as a more detailed review of student transcripts to more accurately guide students into appropriate coursework, and increased advising during their academic careers, may also reduce this issue.
- A summary of the results from calculations of the WTU required to teach undergraduate and graduate courses are presented below. The department has estimated that an additional 2.5 FTEF are required to deliver a quality MS ECE program along with two high-caliber undergraduate engineering programs and to provide supervision on design projects (EECE 699P) and thesis research (699T) without negatively impacting the department's ability to offer and to continuously improve our undergraduate programs in computer engineering and electrical/electronic engineering. The required staffing should reflect existing and anticipated research release and sabbaticals. Currently, the ONR award includes 9 units of release per semester for the next four years. Also, we expect to have one faculty member on sabbatical every year, beginning in 2020.

| Programs | Semester | WTU |
|-----------------------------|----------|-----------|
| Current BS programs* | Fall | 117 units |
| | Spring | 120 units |
| Revised BS programs*‡ | Fall | 125 units |
| | Spring | 124 units |
| Revised MS ECE [±] | Fall | 27 units |
| | Spring | 24 units |

* No significant increase or decrease in undergraduate enrollment was considered in the Computer Engineering and in the Electrical/Electronic Engineering programs or in the students from other departments who take EECE courses to complete their degree requirements.

‡ No additional EECE faculty or lecturers are required above the current level of staffing are required to deliver the revised BS programs. However, part-time lecturers may be required to cover approved sabbaticals and research release time above the current 9 WTU per semester.

± Estimation uses the current MS ECE curriculum as template and assumes that there is limited remedial coursework required by MS ECE students, that the current level of overlap between BS and MS courses remains, and that some MS ECE students take the comprehensive exam rather than enroll in the culminating design project or thesis research.

- **Dedicated financial support is need to support culminating activity design and research experiences, as well as laboratory space allocated for MS ECE projects and research activities. Faculty have actively pursued funding for research with reasonable success. However, these grants can support only a few student projects each year, and are not sufficiently large to provide funds to a sizable fraction of our MS ECE students. Changes in current practices could help to increase support for graduate student research activities. For example, the means to leverage research awards to support other students could come from incentive funds returned to the department or principal investigators. Similarly, a set-aside of Student Learning Fees to support graduate education would offer much needed support.**
- **The equipment available for design projects and thesis research are inadequate. Much of the higher-end equipment are over a decade old and interface to computers that are of a similar age. No advanced software packages have been purchased in recent years to support projects and theses. This is, in part, because the department has focused its efforts to improve the quality of the equipment in its undergraduate laboratories, which is of similar vintage, with the financial assistance of the college. Several of the EECE faculty members are aggressively pursuing funding opportunities that will provide funds to purchase research equipment, which may be used by MS ECE students during their design projects and thesis research. However, this is a process that has a low probability of success and long turn-around times and, while useful, is not a dependable means to rapidly increase the number of state-of-the-art laboratory equipment or maintain the equipment long-term.**

2. Describe the improvement plan and timeline to address areas of concern:

Improvement Plan

- Reform Curriculum.* The curriculum changes are required in part to reflect the expertise of the faculty in the department comprised of more than 60 % are untenured assistant professors. Also, the department plans to incorporate courses that cover the recent technological advancements in our disciplines (Internet of Things, for example). Major revisions are under consideration now for the Bachelor of Science programs, which are expected to be finalized in Spring 2020. Changes to the senior technical electives are also under consideration. These are courses that may be taken by our future graduate students. Hence, the proposed revisions to the undergraduate program will drive some of the reforms of the MS ECE curriculum.**
- Graduate Student Recruitment:* Once the overall direction of the MS ECE curriculum has been determined, the EECE department will partner with the College, the Office of Graduate Studies, and the Office of International Education to develop a comprehensive recruitment plan.**

We will learn from the success of the CSCI Department as it rebuilds its MS Computer Science program, which is working with the Office of International Education to effectively leverage its relationship with the network of agents overseas.

We will identify resources to create recruitment materials and fund attendance at graduate school fairs in the US and overseas as well as initiate other actions that will increase awareness of the CSU Chico MS ECE program and to increase the quality as well as the quantity of applicants to the MS ECE program.

The investment in the modernized curriculum tailored to our faculty's expertise and improved facilities will contribute to the development of an excellent reputation, which will attract high caliber domestic and international graduate students. The stronger reputation of the MS ECE program will strength the overall reputation of the department's programs, supporting the recruitment of domestic and international undergraduate students and draw the attention of employers, whose interests can lead to corporate donations and research grants.

In addition to the development and active dissemination of recruitment materials and participation in regional, national, and international recruitment trips and graduate college fairs, funded TA positions are required to attract high caliber applicants who will support undergraduate programs. The funded TAs, who have appropriate technical skills and are provided sufficient faculty supervision, are needed to replace faculty in some of the undergraduate laboratory courses when these faculty are assigned graduate courses to teach.

There will also be a positive impact on our undergraduate programs as the graduate students interact with our undergraduate students as lab TAs, as colleagues in our extracurricular activities and professional society chapters, and as classmates in our 400- and 500-level courses. There will likely be a savings in teaching costs as graduate students contribute to delivering the undergraduate program.

- 3. Hire New Tenure-Track Faculty and Lecturers.* There are a number of caveats associated with the calculation of staffing needs, some of which were noted under the summary of WTU in Section 1. At present, the department estimates that 12.5 FTEFs are required to offer the complement of undergraduate and graduate courses required for the three degree programs and to provide supervision on senior capstone, graduate design projects, and graduate theses. However, a faculty resource plan that includes the identification of a number of faculty and lecturers, as well as the expertise required, will be developed in consultation with the College and with the Provost and Vice Provost for Academic Programs once the initial direction of the MS ECE curriculum has been determined. The faculty resource plan will be reviewed again when the curriculum has been finalized and the program has been reinstated.

- 4. *Purchase Equipment and Software with Allocation of Associated Laboratory Space.*** There must be an investment in modern equipment and software simulation packages along with an allocation of laboratory space and funds for MS ECE design projects and thesis research. This investment will enable our MS ECE students to develop advanced technical skills while also building a deeper conceptual knowledge. This will enhance the reputation of our MS ECE program with employers and PhD-granting institutions and will quickly assist with the recruitment of future graduate students. Additional laboratory space will be required for the students to use the equipment and software as they create and characterize design projects and conduct thesis research. An annual budget to purchase consumables for the design projects and thesis research and to update equipment and software when required is also needed. Specific equipment and software needs depend on the courses offered. Hence, the instructional resources will be determined after the EECE faculty have agreed upon the set of coursework during the curriculum redesign.

The EECE Department will work with CSU, Chico administrative leaders to determine a realistic level of support and to find innovative ways to maintain and continually modernize these instructional resources. The EECE Department will work with the College, the EECE Industrial Advisory Board (IAB), the ECC Leadership Council, and University Advancement to identify corporate and individual donors whose generosity can be used to rebuild the experimental and simulation component of the MS ECE program. Advancement and the College has demonstrated their success in soliciting donations and grants to upgrade the College's undergraduate laboratories with the involvement of faculty from departments including EECE. It is expected that this effort can be extended to support the needs of the MS ECE program. EECE faculty have and plan to submit proposals that include the purchase of research equipment. The EECE Department and the College will hold discussions with the Office of Research and Sponsored Programs on ways in which indirect costs and research incentives can be used to maintain equipment purchased through these grants.

- 5. *Support for Graduate Coordinator.*** Release time provided for a Graduate Coordinator will be required when the program is reinstated. This is in keeping with other of our graduate programs and with the demands of the position. The Graduate Coordinator will monitor the implementation of the new curriculum and work with the EECE IAB to assure that the program-level student outcomes meet employer expectations.

Past enrollment in the MS ECE program has been dominated by international students, many of whom required a significant amount of advising to ensure that they are properly prepared for the courses in their plan of study, and to address the development of technical English language, adjustment to the US educational system, and support required as students apply for their practical training (CPT and OPT). The Graduate Coordinator will also be responsible for the development

of a training program for MS ECE students who are hired to teach undergraduate laboratories. As the reputation of the MS ECE program builds, the demands on a Graduate Coordinator will be reassessed after a review of the academic preparation of incoming graduate students once the MS ECE program has been re-established.

Timeline

The following timeline is a suggestive and approximate scenario for the reinstatement of the MS ECE program and the admission of a new cohort of graduate students. The timeline assumes that appropriate resources have been secured, actions to address the improvement plan have been taken, and that other variables such as the faculty and instructional resources required to deliver the undergraduate programs are not altered significantly.

- It is expected that the curriculum redesign process will require two years to be completed, including approval of the new curriculum and courses. Given the faculty efforts to revise the undergraduate programs, it is anticipated that the earliest that the redesign of the MS ECE program can begin is in AY 2020-2021.
 - At the end of the first year of the redesign process, the EECE Department will evaluate the staffing required and equipment and software needs of the revised MS ECE program. This evaluation will be conducted with the College, the Office of Graduate Studies, and the Provost and Vice Provost of Academic Programs.
 - Assuming that the minimum level of resources are available to implement the curriculum and assess its success, it is suggested that a recruitment plan will be developed and implemented by the EECE Department, the College, the Office of Graduate Studies, and the Office of International Education no later than one year before reopening of the application process for the MS ECE program. The earliest date when MS ECE student recruitment could begin is AY 2022-2023, if scheduled to be concurrent with the process to reactivate the program, to enable a new MS ECE cohort to matriculate in Fall 2023. However, a more realistic date would be at least a year later.
 - A thorough assessment of the recruitment of students and the MS ECE curriculum will be reviewed during the first three years as students' progress through the program. The results from these assessments will be used to improve the MS ECE program and related activities.
3. **Provide evidence of consultation with faculty, administrators, students, and related stakeholders in the collaborative preparation of the plan, assessment, and timeline. Evidence may include but is not limited to dates, times, minutes, and vote counts from meetings, lists of attendees, correspondence, etc.**

The EECE faculty met on April 11, 2018 and discussed the status of the MS ECE program. The faculty voted unanimously to suspend the program immediately and not accept new students for the 2018-2019 academic year. The reasons for the

suspension are described in the section above on areas of concern. The faculty will reevaluate the suspension of the MS ECE after we have instituted improvements to our undergraduate programs. The results of the meeting were conveyed to the Dean Ricardo Jaquez via email on April 12, 2018, and to Frank Li, VP of International Education, and Sharon Barrios, Interim Dean of Graduate Studies. Dean Jaquez communicated the department's decision to Provost Larson.

A meeting was held on June 14, 2018 to discuss the possible suspension of Master of Science in Computer Science and in Electrical and Computer Engineering. They attendees were Vice Provost Grassian (Academic Affairs), Dean Barrios (Office of Graduate Studies), Dean Jaquez (ECC), Associate Dean Stapleton (ECC), Prof. Henry (chair, CSCI) and Prof. Meehan (chair, EECE). The issues that the two departments (CSCI and EECE) had concerning the Master of Science degrees and the rationale for suspending the EECE program were discussed. Since that meeting, the EECE department chair has met with the Office of Graduate Studies and Office of International Education to identify the steps that had to be taken, given the pause in accepting students in our MS ECE program and to suspend the program.

The formal suspension of the program was approved by the EECE Department on August 24, 2018. The suspension of the MS ECE program was reviewed by the College of Engineering, Construction Management, and Computer Science curriculum committee on September 13, 2018 and approved on September 27, 2018. The proposed suspension of the MS ECE program will be discussed at the November 1, 2018 meeting of the Graduate Council.

A meeting between Vice Provost Grassian, Deans Barrios and Stapleton, and the EECE Chair on January 9, 2019 to review the proposed suspension. Revisions to the proposal have been made to increase clarity about the present status of the MS ECE program and the EECE Department resources that are needed to reinstate the program, to detail the associated internal and external constraints and opportunities, and to identify the internal constituencies who will work in tandem with the EECE Department during the redesign and reinstatement process. The revised proposal has been reviewed by the EECE Department and Deans Stapleton and Barrios.