Susan Cochran
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Chair of the Assembly of the Academic Senate
Faculty Representative to the Regents
University of California
1111 Franklin Street, 12th Floor
Oakland, California 94607-5200

April 27, 2023

KATHERINE S. NEWMAN
PROVOST AND EXECUTIVE VICE PRESIDENT
UNIVERSITY OF CALIFORNIA

Re: Approval of Master of Advanced Study in Engineering (MAS-E) at UC Berkeley

Dear Katherine:

In accordance with the *Universitywide Review Processes For Academic Programs, Units, and Research Units* (the "Compendium"), and on the recommendation of CCGA, the Academic Council has approved UC Berkeley's proposal to establish a Master of Advanced Study in Engineering (MAS-E) self-supporting graduate and professional degree program (SSGPDP).

Because this is a new degree title, and the Assembly of the Academic Senate is not meeting within 30 days of CCGA's approval, Council must approve the program per Senate Bylaw 125.B.7.

I am enclosing CCGA's report on its review of the new program, and respectfully request that your office complete the process of obtaining the President's approval.

Sincerely,

Susan Cochran, Chair
Academic Council

Cc: Academic Council
        IRAP Analyst Procello
        UCB Senate Director Banaria
        Executive Director Lin

COORDINATING COMMITTEE ON GRADUATE AFFAIRS (CCGA)
Erith Jaffe-Berg, Chair
erithj@ucr.edu

ACADEMIC SENATE
University of California
1111 Franklin Street, 12th Floor
Oakland, California 94607-5200

April 19, 2023

SUSAN COCHRAN, ACADEMIC COUNCIL CHAIR

Dear Chair Cochran,

On April 5, CCGA met and reviewed the proposal from the Berkeley campus for a self-sustaining Master of Advanced Study in Engineering (MAS-E). After discussion, the proposal was approved 9-0-1.

The proposal for the MAS-E is driven by the mounting demand for engineers to stay abreast of the fast pace of technological change by addressing scheduling constraints on working professionals. The National Academy of Engineering and the UC Berkeley College of Engineering Advisory Board have identified a growing need for educational programs that graduate highly skilled, interdisciplinary engineers with expert understanding of the latest technology and leading-edge engineering capabilities. Such engineers are expected to navigate a rapidly shifting technology landscape, drawing from multiple skill sets to share new approaches to addressing real-world problems.

A central feature of the MAS-E degree is the use of online, self-contained, one-unit courses that are flexible and small enough for a working professional or student to readily integrate into a busy schedule. Program courses are organized into seven multidisciplinary themes, drawing from content across Engineering's academic field. MAS-E students can tailor and customize their degree to their personal backgrounds, interests, and career goals. Due to the online-only nature of the MAS-E degree, the campus needed an online partner to manage its implementation. Directed by the Provost, the College conducted a rigorous selection process for an Online Program Manager (OPM). The OPM will provide expert support for faculty in designing their courses and creating exceptional video lectures. In addition, by investing substantial funding, the OPM will produce scores of the College's online courses and successfully market the new MAS-E program. After a formal bidding process, Coursera was ultimately selected as the online vendor for this program.

A number of revisions to the MAS-E program were already incorporated into the proposal by way of campus-level review. Of particular note, the campus established better contract terms with Coursera that will benefit the Berkeley campus (e.g., better protection for potential intellectual property). Additionally, there is now an increased return to aid of 15 percent (from five percent in the original proposal), which should foster accessibility for diverse students. Approximately one-third of the online courses will be updated each year, with many already in existence and beta-tested.

Three reviewers were identified to provide detailed comments on the MAS-E proposal (two UC-internal and one external). The reviewers identified several areas of strength, including the focus of the program on working professionals, the fact that can be completed "part" or "full" time, and that it draws from seven interdisciplinary themes: (1) Engineering, People and Society, (2) Energy Systems, (3) Biomedical Engineering, (4) Engineering Data Analysis, (5) Materials and Applied Mechanics, (6) Modeling and Simulation and (7) Electronics and Power Systems. Reviewers also identified some areas of concern (detailed in the Lead Reviewer's letter, attached). These were shared with the MAS-E proposal team, who submitted point-by-point responses to each concern that CCGA (and the external reviewers) raised. CCGA discussed the campus response and found it satisfactory.

UCPB also reviewed the proposal and found it financially sound and well-grounded. A copy of the UCPB report is attached.

As you know, CCGA's approval is the last stop of the Academic Senate side of the Systemwide review and approval process except when the new degree title except when the new degree title must be approved by the Academic Council. I submit this for your review and have enclosed the Lead Reviewer's report. Please do not hesitate to contact me if you have further questions regarding the proposal.

Sincerely,

Erith Jaffe-Berg
CCGA Chair

cc: James Steintrager, Academic Council Vice Chair
        CCGA Members
        Monica Lin, Academic Senate Executive Director
        Michael LaBriola, Academic Senate Assistant Director
        Chris Procello, Academic Planning and Research Analyst
        Lisa García Bedolla, UCB Dean of the Graduate Division
        Jocelyn Surla Banaria, UCB Senate Executive Director
        Sumei Quiggle, UCB Senate Associate Director

Prof. Michelle A. O'Malley
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April 14, 2023

Dear Chair Jaffe-Berg,

The following letter details my report on CCGA review of the proposed Master of Advanced Study in Engineering (MAS-E) on the Berkeley campus. The graduate degree proposal was submitted by and will be managed by the College of Engineering at UC-Berkeley. It was approved by the Berkeley campus Graduate Council (after several iterations and revisions) as well as the Divisional Council of the Academic Senate and the MAS-E proposal was forwarded to CCGA on August 22, 2022 for review. The MAS-E program is a self-sustaining graduate program (SSGP), and a separate evaluation was submitted by the UC Council on Planning and Budget (UCPB) that deemed the program to be financially sound.

As described in the MAS-E proposal documentation, it is an entirely online-only MA degree that can be completed by working professionals, essentially at their own pace. It is mostly targeted at those with STEM degrees who are currently working in industry as a "maintenance" degree in new technologies and areas. It consists of 22 online only asynchronous 1-unit mini courses to enable max flexibility and a 2-unit capstone project that altogether can be completed anywhere from 1-4 years. Due to the online-only nature of the MAS-E degree, it is important that an online partner be identified that can manage its implementation. After a formal bidding process, Coursera was ultimately selected as the online vendor for this program after rigorous investigation and negotiations.

A number of revisions to the MAS-E program have already been incorporated into the proposal plan by way of campus-level review. Of note, better terms of the contract with Coursera were reached that will benefit the Berkeley campus (e.g. better protection for potential intellectual property). Additionally, there is now an increased return to aid of 15% (from 5% in the original proposal), which should foster accessibility for diverse students. Approximately 1/3 of the online courses will be updated each year, with many already in existence and beta-tested. All student admissions decisions are to be decided by Berkeley faculty. Courses will also have synchronous office hours to promote real-time contact with instructors and the students, and there exists a wealth of Berkeley faculty (and graduate students) who are willing to develop and teach the courses that will be offered. Market research supports the program, with as many as 200 yearly admits when the program is running at steady state, and a total projected revenue by year 9 of ~$9 million (break-even point by year 4).

Three reviewers were identified in fall 2022 to provide detailed comments on the MAS-E proposal (2 UC-internal and 1 external). The reviewers identified several areas of strength, including that that the program is targeted to working professionals, can be completed "part" or "full" time, and draws from 7 interdisciplinary themes: (1) Engineering, People and Society, (2) Energy Systems, (3) Biomedical Engineering, (4) Engineering Data Analysis, (5) Materials and Applied Mechanics, (6) Modeling and Simulation and (7) Electronics and Power Systems. The reviewers agree that a large pool of potential students could be recruited to the program to sustain it. Minor concerns from external reviewers centered around the budget model, and how instructors would be compensated. When this concern was shared with the MAS-E proposers they cited the place in the proposal where this calculation was to be found, and

agreed that the cost structure would depend on the number of students enrolled and the number of courses developed. Major concerns from external review centered around whether the MAS-E degree would achieve an amount of technical depth commensurate with a master's degree in engineering.

In light of the external reviews, CCGA discussion of the MAS-E program (on both 3/1/2023 and 4/5/2023) also identified many strengths. For example, students can choose from a large "library" of potential courses, with 85 of these 1-unit courses already developed. The council members appreciated that much thought had gone into refreshing the content of the courses, and that they would reach a new type of student (e.g. working professionals) that may not otherwise pursue graduate studies. Weaknesses of the proposal were also identified. Though there are a large body of courses that will be developed, there is low representation and participation of faculty from traditional engineering disciplines like Chemical Engineering and emerging areas of study (e.g. Biomedical and Biological Engineering). Moreover, CCGA members wanted clarification of the role of GSRs on teaching, especially in light of the recent UAW negotiations, as well as how the success of students would be measured. CCGA encouraged the MAS-E proposers to consider incorporation of more synchronous for students, as well as to restrict course choice somewhat to promote additional technical depth. CCGA members were also concerned about proper "branding" of the degree – namely that students know that this is an MA degree that brings with it different opportunities and value than a traditional MS degree would be in engineering.

The above concerns were shared with the MAS-E proposal team, who submitted point-by-point responses to each concern that CCGA (and the external reviewers) raised. The proposal team assured that students would be recruited following rigorous application review, certifying that students are well prepared for coursework. Regarding the concern about the level of technical depth that would be achieved, the proposers emphasized that the presence of the capstone course will reinforce this concept. Moreover, the proposers clarified that such content is typical of an MA degree, and pointed to the Berkeley graduate division website where the value of different degree types in different fields are clarified for potential applicants. The MAS-E proposers also reassured CCGA members that adequate synchronous content is in place for students, and that the role of GSRs in instruction is very minimal and will not be impacted by new contracts with the UAW.

In summary, CCGA commends the Berkeley campus and the MAS-E proposers on developing this new, innovative degree program. We look forward to its success, and recommend its approval.

Sincerely,

Michelle A. O'Malley
Professor, Department of Chemical Engineering
Associate Director, Bioengineering Program
University of California, Santa Barbara
Chair, UCSB Graduate Council
Member, CCGA

UNIVERSITY COMMITTEE ON PLANNING AND BUDGET (UCPB)
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November 4, 2022

ERITH JAFFE-BERG, CHAIR,
COORDINATING COMMITTEE ON GRADUATE AFFAIRS

RE: UC BERKELEY MASTER OF ADVANCED STUDY IN ENGINEERING

Dear Erith,

The proposed self-supporting Master of Advanced Study in Engineering at UC Berkeley appears to UCPB be an appropriate effort to tap a new market of students, working engineers needing to refresh their technological expertise.

The program's recorded lectures and synchronous faculty office hours afford both great flexibility to students and opportunity to learn directly from faculty. There appears to be no impact on existing state-supported programs: faculty are paid as consultants, all classes are remote, and intellectual property rights to created courses remain with faculty and the campus.

The program has contracted with Coursera as Online Product Manager (OPM). Coursera will provide a $3.5M initial investment split over the first two years to underwrite the development of the program after which it will receive approximately 40 percent of ongoing revenue. The initial investment means that even in a low-enrollment scenario, the program will experience positive cash flow in the first two years, and only the third year of existence is it at risk of a deficit even in a lower-than-expected enrollment scenario. The budget projections provided for the first nine years of the program appear to be sound. Under the anticipated enrollment scenario, these project cumulative net revenue of approximately $50m and $22m to the College and to campus assessment, respectively. The projected net revenue is robust even in a low enrollment scenario at $7.5m and $5.5m, respectively.
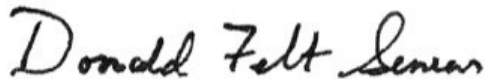
The proposal for this program reflects a positive impact of very robust review at the campus level. This resulted in the OPM selection via an RFP process rather than sole source, and a decrease in revenue shared with the OPM from 50% to 40%. The intellectual property agreement with the OPM was strengthened by responding to internal reviewers' objections. Critical to a program designed to deliver cutting edge technical training, the refreshment rate for courses was increased. Campus

review also resulted in an increase in the per unit tuition from $1,750 to $2,000, with a concomitant increase in the return to aid from five to fifteen percent. Unfortunately, many of the changes made in response to the campus review, while reflected in the budget sheets, are not reflected in the text of the proposal. It was necessary to read the responses to campus reviews to find some of the details, making this a difficult proposal to review.

UCPB is pleased to provide systemwide review of the program, and the committee suggests that a thorough review of the program after three years is appropriate: to determine if the program serves the stated purpose to the intended students; to certify that courses are appropriately refreshed to continue the stated goal of updating students' technical knowledge; and to evaluate faculty compensation. In addition, UCPB members noted that the courses are arranged into subspecialties and wondered if creating a subspecialties certificate program might attract specific industry notice. Offering the one-unit courses individually might also serve an interested clientele while generating additional revenue.

UCPB recommends approval of this degree program.

Sincerely,

Donald Senear, Chair
UCPB

Attachment
cc: UCPB

UCPB Review of Self Supporting Degree Program: "Master of Advanced Study in Engineering"

Prepared by: James B. Rawlings, UC Santa Barbara
Date: 10/30/2022

UC Berkeley has proposed a self-supporting degree program, "Master of Advanced Study in Engineering," (MAS-E). The academic justification of the program is stated in the proposal:

"Our planning for the MAS-E is driven by the mounting demand for engineers to stay abreast of the fast pace of technological change with a program suited to addressing the unique constraints on working professionals who need to remain employed while gaining cutting-edge knowledge and analytical skills to move ahead in their careers. There is a growing societal need for engineering leaders with the very latest, state-of-the-art technological expertise who can successfully direct projects and organizations in global environments that cross disciplinary boundaries."

The proposed MAS-E course of study requires completion of a total of 24 online course units, including 22 one-unit and one two-unit capstone project course. The Berkeley faculty MAS-E lectures will be pre-recorded and available 24/7 to address the student market of working professionals. The Berkeley faculty will also be available to the MAS-E students synchronously during regular online office hours.

The proposed tuition is $2,000 per unit, for a total cost of $48,000. There is no proposed tuition increase during the first nine years in the budget model. The targeted total enrollments for the first three years are: 225, 525, and 700 students. The proposal also contains a low enrollment scenario for the first three years with: 50, 125, and 175 students, i.e., roughly 1/4 of the expected enrollment. The budget model is built around a nominal two years for completion of the degree. The projected net revenues for years 1-3 are: $0.5M $2.1M and $3M for the expected enrollment case, and $0.5M, $0.8M$, $-0.15M in the low enrollment scenario. Year 3 in the low enrollment case is the only year that shows a deficit. The longer term (year nine, steady-state) yearly net revenue is $7.5M for the expected enrollment and $1M for the low enrollment scenario (Appendices B2 and B3).

Coursera was chosen as the Online Product Manager (OPM). From the budget spreadsheet in Appendices B2 and B3 it appears that the OPM provides $3.5M in the first two years as an initial investment, and receives approximately 40 percent of the total revenue.

The UC Berkeley indirect costs (IDC) for the MAS-E program is 15 percent of total revenue. The UC Berkeley Budget and Financial Operations office has approved the proposal's budget model.

It is not completely clear how the proposed IDC rate was determined, but since the course units are all online, it seems reasonable. There is no demand for classroom facilities, and the new IT demand created by the several hundred students in the program is not likely to require a large investment beyond what is required for the normal maintenance and growth of the Berkeley campus IT infrastructure.

In the expected enrollment scenario, the nine-year, cumulative program net revenue to the College of Engineering (COE) is $50M, and with IDC, the cumulative net revenue to the UC Berkeley campus is $72M (Appendix B2). In the low enrollment scenario, these numbers are: $7M and

$13M, respectively (Appendix B3). The benefit to the COE and UC Berkeley campus for providing this online degree program are thus clearly defined and credible. Serving a new market of students with an online degree whose needs are not met by current state-supported programs enhances the mission of the university without negatively impacting the state-supported programs.

The online lectures in the MAS-E program are created by the COE faculty. The faculty are compensated through consulting fees by the OPM. The faculty fee is $20,000 per course. The ownership of the intellectual property (IP) resides with the faculty and the university. Strengthening the faculty's and university's IP ownership with respect to the OPM was one of the key outcomes of the UC Berkeley internal review. The program's course offerings will grow to 100 courses during the first two years. To keep the content current, approximately 1/3 of the courses will be updated each year. The faculty fee for the update is expected to be about $4000 per course.

The proposed program sets aside 15 percent of the revenue as return-to-aid for needs-based fellowships to help foster a diverse set of students, which is detailed in the proposal's student recruitment plan. Note that the original proposal set aside only 5 percent as return-to-aid, and this was increased to 15 percent after UC Berkeley's internal review process.

A market analysis was performed by the firm NavB; they surveyed 454 people with relevant educational backgrounds who expressed interest in masters-level engineering programs. The survey found that UC Berkeley is a preferred brand compared to existing programs at UCLA, Columbia, Michigan, Purdue and USC. The rather inexpensive price point ($42k) for the proposed program makes it especially attractive in this market.

The UC system already has two other divisions with online MS degrees in engineering: UCLA and UC Riverside. In comparison to these MS programs, the proposal emphasizes (p. 18) that the MAS-E program offers increased flexibility and interdisciplinarity in areas of study, and offers working professionals the convenience of readily completed one-unit courses.

The proposal forecast for enrolled students is: 20% in-state students, 15% out-of-state students, and 65% international students, based on COE's experience with the other engineering professional master's degree programs.

The areas that should be evaluated at the MAS-E program three-year review are some of the following standard ones: (i) did the program reach the intended audience and achieve its enrollment goals? (ii) is the program maintaining the relevance of the courses? (iii) is the compensation model for the faculty giving appropriate incentives so that a reasonably broad cross-section of COE faculty are participating in course creation and updates.

In summary, the UCPB finds that the MAS-E proposal is timely and addresses an important student market need not addressed by current UC programs. Although time consuming, the review process at the division level has been rigorous and strengthened the initial proposal in several key ways. The UCPB is pleased to recommend approval of the MAS-E program.