

## Masters in Software Engineering Online Program, CSUF

### Program Performance Review (PPR) Report

April 12, 2019

A three-member review committee (committee) was assigned to perform a Program Performance Review of the Master of Science in Software Engineering (MSE) online program of California State University, Fullerton (CSUF). The team consisted of the following members:

1. *Dr. Walt Scacchi*, Principal Scientist at Blast.com and Sr. Research Scientist Emeritus/Research Faculty Emeritus in the Institute for Software Research, University of California, Irvine
2. *Dr. Jeho Park*, Director of the Murty Sunak Quantitative and Computing Lab, Visiting Assistant Professor, Mathematical Sciences, Claremont McKenna College
3. *Mr. Kenara Ly*, Senior Director of Application Development, California State University, Fullerton

The committee was provided with a self-study report, summarizing the following information:

- Mission and goals of the MSE program
- Department/Program description and analysis
- Student academic program achievement and assessment of student learning outcomes (SLOs)
- Demand and enrollment status
- Faculty
- Student support and advising
- Resources and facilities
- Long-term plans

The committee met with the MSE program coordinator, Computer Science department chair, dean of the College of Engineering and Computer Science, associate dean of the College of Engineering and Computer Science, faculty members teaching the courses in the program, and current as well as former students of the program on April 12, 2019 to discuss the following:

- Strengths of the program
- Areas and aspects that need improvement
- Actions that would help enhance the effectiveness of the program

Overall, the committee has concluded the MSE program has been very successful in supporting its mission and achieving its goal, i.e., "to prepare individuals for careers as software engineers and managers in the industry and government agencies, as well as for advanced study as researchers in the software engineering areas".

### Program Strengths

The program has gained remarkable national recognition. In 2019, the *US News and World Report* nationally ranked the MSE program at 1<sup>st</sup> among non-PhD granting universities, 3<sup>rd</sup> in California, and 26<sup>th</sup> overall. *Best Computer Science Schools* ranked the MSE program 5<sup>th</sup> in the 25 Best Online Master's in Software Engineering Degrees in 2018.

The committee also found other significant strengths of the program that include:

- A coherent dedicated group of full-time faculty members teach the courses.
- Curriculum structured to address the needs of the students, who typically are working professionals.
- Former and current MSE students find faculty members are responsive with timely, pertinent, and adequate guidance on coursework and career development.
- MSE students past and present -- the MSE program has graduated hundreds of students who contribute to their own well-being, their employers, and the U.S. economy. These students are the first-layer surround of the MSE community developed at CSUF.
- The MSE program is of great value to students, industry, and the University.

Though the program is highly successful, there is room for improvement. The committee recommends the following to further enhance the effectiveness of the program:

### **Areas and aspects for improvement**

#### ***Update curriculum***

- One of the main basis on which the MSE program competes against larger institutions for students and for corporate-sponsored students is the relevance of its curriculum. An outdated curriculum is a competitive disadvantage.
- There is need to update and integrate foundational topics like security, cloud-based systems, scalable systems, and AI/machine learning into the curriculum or existing courses.
- There is need to update the adoption and use of open source software, component-based systems, documentation-light systems, and accommodating and migrating legacy systems within the current course offerings.
- There is need to produce high definition versions of online course materials when course material has become dated and revised with new materials.
- There is need to consider how to utilize supplementary media including short-form video (e.g., move to multiple 7-10 audio/video lectures followed by short quizzes versus current 75 minute long form lectures that record in-class lectures).
- Faculty have very modest resources to use for professional development or to attend major conferences and workshops where they can interact with colleagues to acquire up-to-date subject matter expertise, which provides the basis for updating the MSE curriculum..

#### ***Competing for future students***

- There are growing numbers of regional, national, and international institutions offering online MSE programs. A commitment to status quo will increase likelihood of declines in the program and student enrollment.
- More competition will drive up costs of student recruitment. If these costs cannot be addressed, then declining enrollment and national ranking may be expected.
- Available resources for MSE student recruitment are very limited and have decreased over time.

- But CSUF may provide lower cost tuition for MSE degrees of comparable market value to graduates and industry versus Ph.D. granting institutions.

***Provide better support for job placement for MSE who are seeking full-time employment***

- Many but not all MSE students are fully employed. So there is need to look for ways to improve job outreach and social networking with companies looking to hire MSE graduates who are not already fully employed, and who cannot attend on-campus job fairs.

**Actions that would help the effectiveness of the program**

The MSE program was started 15 years ago, yet it still relies on online course fees established at that time to provide support for curriculum enhancement. From 2004 to 2019, inflation has increased about 34%, so a \$33/unit fee in 2004 corresponds to an inflation adjusted fee of \$45 in 2019. Therefore, finding ways to increase the funding to allow faculty to improve and update the curriculum should be a top priority, especially to maintain the program's quality and national rankings in face of growing competition.

If possible, it would seem to be advantageous to adjust course fees from a 2004 to 2020 level. Given the effort to raise such fees, perhaps the goal of such an increase should be to raise it \$50/unit, which is still cost competitive with other MSE programs. If an online course fee increase can be implemented, then some further priorities can be considered for implementation and action.

- Use current fee allocations (\$33) to cover existing expense priorities. Then use additional fee allocation (\$17) to cover costs of:
  - Faculty development of new expertise of subjects to be integrated into the updated MSE curriculum (security, cloud services, AI/machine learning, open source software, etc.), where such development is facilitated by engagement on-site external expert/consultant brought in for engage, inform, and discuss MSE faculty and curriculum topics.
  - Faculty travel to corporate partners and potential partners sites that hire/promote MSE graduates, to develop and sustain MSE corporate social networks.
- Revamp MSE Capstone course structure and results.
  - Provide an online repository that can showcase MSE student capstone and course projects, in ways that may also promoted online to MSE program social media networks.
  - Recruit alumni mentors to advise capstone projects.
- Encourage MSE faculty to engage in comparative study of Top 25 MSE programs to identify potential areas for improvement in curriculum, student development, corporate relations, course fees, degree/course tuition, etc.
- MSE faculty should consider how best to coordinate projects across courses, where each course addresses course topics arising in the course projects (software requirements, design and architecture, testing, maintenance, etc.).
- Offer additional elective courses not only for enrolled students but also for alumni.

- New elective courses may cover trending technologies such as AI/ML
- Alumni may take them as discretionary fee-based “lifelong learning” courses, mini-courses, or invited lecture series, that might also generate extra revenue for the program. Costs for such curriculum supplement preparation and online production may be covered by proposed course fee update. Current MSE students might also be allowed to take such discretionary and complementary online course materials.
- Such alternative courses may then be appropriate as a way to engage either adjunct faculty/lecturers, or alumni who have since acquired advanced professional level mastery of subjects that can provide more depth, or take more time to integrate into the existing course offerings.
- Collect alumni success stories for advertisement and recruitment, especially those hosted and shared via online social media networks for MSE alumni, corporate partners, and friends.
- Look for new ways for MSE faculty to utilize University-wide resources such as:
  - Instructional Designer for online curriculum development.
  - Engineering’s Corporate Partners Program for capstone and internship opportunities.

Overall, as noted above, the PPR committee was very impressed with the quality of the faculty, students, national rankings, and other accomplishments of the MSE program. In order to insure the program can continue to flourish, maintain its national rankings and remain competitive, it is necessary to find additional resources that can be utilized to update and sustain the program. We hope such an outcome can be realized.