UCC Program Review Committee summary of review

Program – Department of Mechanical Engineering

This program includes the following degrees and certificates:

- B.S. in Mechanical Engineering
- M.S. in Mechanical Engineering

Recommendation

This program is found to be viable, see report for commendations, concerns, and recommendations.

Comments – non-binding

This review was one of several to use the program’s accreditation process as part of the review, in this case only for the undergraduate program.

The next review may be timed to coincide with the accreditation of the undergraduate program in order to reuse some self-study materials, but, there should be a site visit involving internal and external reviewers.

Date of last review – AY 2006
Date of this review – March 2014

This review has been sent to program chair, he had no comment.
This review has been sent to program college dean, he had no comment.
This review has been sent to graduate council, they have no comment.
Mechanical Engineering, MS

Robert L. Mullen & Scott Sparks, Reviewers

This review is based on a visit to the Russ College of Engineering and Technology on March 11 and 12th 2014. The review team met with the senior leadership of the program (Prof Pasic Graduate Director and Prof. Kremer, Department Chair), Dean Irwin, graduate students from the College, tenured faculty, and probationary faculty. We also toured several laboratories in the college.

Faculty Profile

Current faculty size and distribution

Total Faculty of 11, 4 Professors, 2 associate professors and 5 assistant professors. With a MS population of around 30 resident students yields 3 students per faculty which is a reasonable advising load. Hiring in an additional assistant professor in an area of strategic importance would strength the program. The balance among ranks is acceptable. The undergraduate student/faculty ratio of over 33 is high for a research university and may limit the growth of the graduate program.

Research, Scholarship, and Creative Activity

Current Department RSCA

A total of 3 reviewed publications (journals and conference publications) is acceptable for an MS program. I could not tell from the report the number of papers that were associated with maters thesis. This would be useful to evaluate the quality of the thesis work, as one would expect at least one publication from each MS thesis.

External funding

The external funding is adequate to support the MS program with an average of around $3MM a year or 273K per faculty. The funding, however, seems to be generated by only half of the faculty.

Resources (financial, space, personnel)

This is the first program review where I did not hear from the constituents significant concerns about financial resources. I find this unusual for faculty! My interpretation is that resource are allocated by the college to insure that most of the financial needs of the graduate program are being satisfied.

Educational Quality

Students

During the meeting with the department leadership, there was a request that the College provide assistance in recruiting graduate students. (This statement may have been made in connection with the
ICS Ph.D. program). About half of the MS students are recruited from the undergraduate class at OU. This is an indication that the undergraduate students see both a value in continuing their education as well as an endorsement of the quality of the undergraduate education that they have received.

**Faculty Diversity**

The gender diversity of the students seems a little low (7% female compared to the national average for ME programs of 14% [ASEE 2008 Engineering by the Numbers]). I would encourage continued efforts to increase enrollment of female graduate students.

**Curriculum**

The MS program follows conventional requirements for engineering masters. The core requirements provide a common basis in fundamental mechanics, writing, and computational methods. The program provides the students the ability to focus is several areas of mechanical engineering. Both a thesis and non-thesis (project) options are provided.

The completion time of 4.5 semesters years is a little long for an MS degree programs.

**Mentoring and advising of students**

In the discussions with the students, there was satisfaction with the support provided by the graduate advisor. I could not find a specific mentoring plan for the graduate program.

**Financial Support of graduate students**

The range of student stipend where 14k to 24k. 14k is very low for research active graduate students.

**Teaching assessment**

Student comments supported an effective learning environment with instructors providing good classroom instruction. I did not review quantitative teaching evaluations.

**Post graduation career placement**

The placement information provided in the self-study indicates graduates are successful in finding post-graduate employment in the field of Mechanical Engineering.

**Areas of Improvement**

The current faculty workload in teaching is not consistent with a research university and may impact the future of the program. Additional faculty hires are needed for the current program size.

**Recommendations**

- For new faculty, some form of formal orientation would be useful to let new faculty learn the available resources that the university can provide.
• A collection of best practices as well as a brainstorming session on methods to improve graduate student recruiting would be useful for the College to conduct.

Commendations

The colloquium course which has outside speakers presenting to the students has enhanced the students’ contextual understanding of the research work they are doing. This was evident in the discussion with the graduate students from the program.

The department appears to be engaged in multi-disciplinary research, which supports other units of the college.

Overall judgment: the program is viable.
15 June 2014

Review of Mechanical Engineering (ME), Undergraduate Program
Orianna Carter, Reviewer

Recommendation: Viable

Faculty Profile

-Current faculty size and distributions
There are a total Faculty of 11, 4 Professors, 2 associate professors and 5 assistant professors. The faculty profile has remained steady since the last review with retirements balanced with new hires in the same areas of expertise. There was one new hire being of female gender. The undergraduate student/faculty ratio of over 33 is high for a research university. Hiring an additional assistant professor in an area of strategic importance would strengthen the program. The balance among ranks is acceptable.

-Current department RSCA
RSCA within the ME department primarily takes the form of peer-reviewed journal articles and conference publications / presentations, disseminating research in both technical fields (Manufacturing, Materials, Energy, Robotics, Biomedical devices) and engineering education. Faculty members participate in many disciplinary conferences, including the major professional societies (ASME and ASEE).

External funding
The external funding is adequate to support the UR and graduate ME programs with an average of around $3MM a year or 273K per faculty. Research programs have attracted support from the Department of Energy, Air Force Office of Scientific Research, NSF, NASA, US EPA, Ohio Department of Development as well as various companies. Research funding jumped 2.5 times from the previous seven years (1997-2004) according to data provided by the OU Office of Research. The funding, however, seems to be generated by only half of the faculty.

Financial resources
The college appears to allocate resources among the departments to ensure that the financial needs of all programs are satisfied.

Student recruitment
Overall, about half of the graduate students are recruited from the undergraduate class at OU. This is an indication that the undergraduate students see both a value in continuing their education as well as an endorsement of the quality of the undergraduate education that they have received. Undergraduate enrollment averages 250-280 FTE with 40% of students participating in Cooperative Education Programs.
Diversity
Minority students have remained relatively steady at levels between 5 and 10% as compared to a national average of 34.6% (ASEE 2009 Engineering by the Numbers; minority including African Americans, Asians, Hispanics and others). Gender diversity of the students is also lower than average (5.4% females compared to the national average in UR engineering programs of 17.8%). A recruiting initiative is in place to increase yield of female applicants including outreach to undecided female students in the college and university to attract them to mechanical engineering.

Curriculum
The UR program follows conventional requirements for engineering degree programs and provides students the ability to focus in several areas of mechanical engineering. The core curricular requirements provide a common basis in fundamental mechanics, writing, and computational methods and includes courses from or shared with Electrical Engineering, Engineering Technology and Management, Chemical Engineering, Civil Engineering, Physics, Chemistry, and Mathematics. The ME curriculum culminates in a major, year long, capstone design which requires integration of multiple competing objectives including economic and environmental, including the use of standards, manufacturing and testing of products. ME courses do not serve a large number of majors from other departments, but rather primarily from other engineering departments. ME faculty participate in teaching courses required by multiple engineering programs, including Statics, Dynamics, Thermodynamics, etc.

Mentoring and advising of students
Each student is assigned a full-time member of the ME faculty as an academic advisor. Student performance is evaluated primarily in individual classes, using quizzes, tests, project reports, presentations, performance review meetings, and other similar methods. Some of these class-level evaluations are linked to program outcomes, and faculty members monitor overall performance of students in their classes relative to those outcomes. Student grades are compiled in a Degree Audit Reporting System (DARS) report and are reviewed each quarter by the faculty advisor and placed on probation if GPA falls below level required for graduation.

Teaching assessment
A Mechanical Engineering Advisory Board assists in the development and periodic review (3-year cycle) of the department's mission and educational objectives and plays a lead role to ensure that the ME program is in line with (and updated continuously to meet) industry needs and expectations. Student achievement of program outcomes (equivalent to ABET Criterion 3) follows measurable criterion which indicate performance level of competence and mastery (with formal review every three years) under the responsibility of the program faculty. Quantitative teaching evaluations were not reviewed.

Post graduation career placement
The placement information provided in the self-study indicates graduates are successful in finding employment in the field of Mechanical Engineering. According to ASEE 2009, OU was rated 15th in engineering schools awarding bachelors degrees, with ME by far the largest program of study (23% of degrees awarded). OU graduate respondents (93%) were either in graduate school or reported obtaining jobs within 2 months of graduation and were very, or extremely, satisfied with current starting salary (average $57,376).
Areas of concern
The current faculty workload in teaching is not consistent with a research university and may impact the future of the program. Additional faculty hires are needed for the current program size.

Recommendations
For new faculty, some form of formal orientation would be useful to let new faculty learn the available resources that the university can provide. A collection of best practices as well as a brainstorming session on methods to improve undergraduate student recruiting would be useful for the College to conduct.

Commendations
The department appears to be engaged in multi-disciplinary research, which supports other units of the college.

Overall judgment: the program is viable.