UCC Program Review Committee summary of review

Program – Department of Industrial and Systems Engineering

This program includes the following degrees and certificates:

- B.S. in Industrial and Systems Engineering
- M.S. in Industrial and Systems Engineering
- M.S. in Engineering Management
- Ph.D. Mechanical & Systems 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, his comments lead to some corrections to the report.

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.
RECOMMENDATION: Viable

Russ College of Engineering’s Industrial and Systems Engineering (ISE) has a viable undergraduate program that plays a substantial role in the University’s overall mission. As noted in the review, some aspects of the program are to be commended, such as:

ISE maintains a comprehensive, well-defined and ongoing evaluation process regarding the effectiveness of its outlined curricula, instructional delivery and alignment with criteria such as meeting learning outcomes and objectives. There is a broad contribution from faculty, students, outside instructors, alumni and industry in identifying areas that require attention or where there is room for improvement in meeting the program’s overarching goals.

The program provides an educational format that synergizes well with its industrial partners, many of whom are involved in the evaluation process through an advisory panel role and consistently engage in hiring graduates from the program.

Significant accomplishments include indicators of the quality of the department. For example, in the Fall of 2012, an OU ISE entry in the national ergonomics competition won first place. Our undergraduates continue to receive nationally competitive scholarships (two in the last two years). One OU ISE undergraduates participated competitively as a finalist in the Institute of Industrial Engineers Research Paper Competition and the ISE department as a whole was a co-first place winner of the Innovation in Curriculum Award sponsored by the Council of Industrial Engineering Academic Department Heads.

Funding to support ISE’s undergraduate and graduate (Masters) programming, its highly qualified faculty and administrators, facilities maintenance and equipment upgrades appears to be adequately progressive and anticipates continued successful implementation. Investments in current technologies and successful application of diverse modalities of learning are evident and proactive. Initiation of a new online Masters degree program in Engineering Management (MEM, Dec. 2011) anticipates generation of revenue for ISE’s full support of ISE faculty, which currently are 90% funded under the ISE budget.

The reviewers also express some concerns, among them:

Upon review of final project syllabi, instructor commentary and committee recommendations, this Academic Program Review Committee makes the following observations:

The regularly assessed Performance on Program Outcome review suggests that many students were unable to synthesize new material with existing knowledge to produce new knowledge, which essentially requires higher order thinking skills. A review of identified program skills that are consistently assessed, per each course offered under ISE curriculum, noted that higher order synthesis process and critical analysis skills are not specifically outlined and evaluated.
Thus, earlier implementation of these higher order thinking skills under the ISE course program coursework might help assist students in preparing for their final design project and result in more consistently documented outcomes.

Further noted, data reported on the success rates of graduating student alumni lists a significant number of students employed in industry but provides little relevant statistical information documenting success of the program, i.e., ratios employed vs. unemployed, time to hire, length of employment, career advancements, continuing education, etc.). A review of the survey questions sent to alumni revealed extensive questions were posed and should provide a thorough assessment of ISE impact to student careers upon construction of relevant data sets.

Appendix D, Institutional Summary Statement from Russ College Self-Study is noted as missing from documents available for this review.

These concerns and the recommendations in the reviews should be addressed prior to the next regularly scheduled review.
Review of the programs: Masters of Science Industrial and Systems Engineering; Masters of Engineering Management; and Ph.D. Mechanical & Systems Engineering

Angie Bukley & Orianna Carter, Reviewers

Recommendation: Viable

This review is based on a visit to the Russ College of Engineering and Technology 11-12 March 2014. The review team met with Dr. Robert Judd, ISE department chair, Dr. Gursel Suer, ISE graduate chair, Dr. Rudi Pasic, ME graduate chair, Dean Irwin, graduate students from the College, tenured faculty, and probationary faculty. A facility tour was provided. A read-ahead package containing a Russ College general overview briefing deck, enrollment and graduation statistics for Engineering graduate programs, the department self-assessments, and general guidelines for the review was provided. In addition, a copy of the Russ College Strategic Plan and dashboard metrics were provided upon request of the reviewers.

The ISE Department graduate programs comprise a MS in ISE, MEM and a joint Mechanical & Systems Engineering PhD.

Faculty Profile

Current faculty size and distribution

According to the ISE self-assessment document (June 2010), there were nine ISE faculty members. A check of the Russ College web site reveals that today, there are 10. The department chair commented that the department could use a few more faculty members particularly given that one slot is being temporarily held open for a faculty member who has moved into an administrative position. Those teaching duties, currently filled by three part time faculty hires, do not provide assistance with research activities. Funding for the energy/environment programs remain significant, yet sufficient faculty in those target areas are needed.

The distribution of rank is reasonable to support the programs offered. Faculty expressed concerns with teaching loads and meeting student needs as department grows into a fully active research facility.

Research, Scholarship, and Creative Activity

Current Department RSCA

Based on the information available in the self-assessment document, there was an average of nearly four publications per year per faculty member (2010).

External funding

The ISE department generates ≈$900,000/year in research funding.
**Resources (financial, space, personnel)**

No significant concerns about financial resources were raised. Allocations in assistantships and their workspace have recently improved.

**Educational Quality**

**Students**

According to the statistics provided, the number of students in the ISE MS program has been relatively steady over the last 10 years with good graduation rates. The number of PhD students in the joint program has also been steady. The demographics are skewed towards international students. The comment was made that it is difficult to recruit domestic students with most of the domestic graduate students having graduated from OU into the masters program. There are ~20-30% females in the ISE department, none in ME.

**Faculty Diversity**

The majority of ISE faculty members are Caucasian male, with one female faculty member. Future hires from under represented groups would improve the diversity of the department and potentially that of the graduate student population.

There was a concern voiced regarding the need to raise the profile and ranking of the graduate programs to attract more US domestic students, particularly into the Ph.D. programs.

**Curriculum**

The curriculum described in the self-study document is appropriate for the graduate programs offered. Although the integrated ME/ISE PhD currently offers separate courses, it is expected that a logical progression will be toward a combined curriculum. The department employs a number of quality control mechanisms, including annual reviews of the graduate courses offered. Proposal writing is a key component as well as an expectation for 3-5 refereed publications per student.

**Mentoring and advising of students**

From the student comments on the program, there was sufficient mentoring and advising of the students in the program. The faculty to student ratio is about 1:4 from the information available. A Colloquium for students (undergraduate and graduate) is designed to meet, discuss and present thesis with invited speakers from other departments. Networking opportunities result from invited national industry leaders and alumni throughout the two-semester Colloquium.

**Financial support of graduate students**

The stipends paid in general seem low across the board. To attract high-quality domestic students, this point needs to be reviewed and action taken to bring stipends up to a more competitive level.
**Teaching assessment**

The department uses the annual review process, seven-year reviews, and the annual retreat to provide feedback to the faculty to maintain/improve the quality of academic content delivery. Quality control assessment measures include qualifying exams and ABET. The online program follows Quality Matters criteria and is listed in the top 50 ranking US News Report. The comment was made that there could be better interactions between the ISE and ME faculty members.

**Post graduation career placement**

Students completing the graduate programs (approx. 3-4 years, PhD) find employment predominantly in domestic industry (2:1) vs. academia. Approximately 25% of the PhD students are hired before they complete their degrees, typically before completion of dissertation. Overall placement track record is compelling, with demand from employers moving towards PhD graduates.

**Areas of Improvement**

No significant areas of concern identified.

**Recommendations**

- Consider increasing stipends to a more competitive level.
- Explore ways to raise the profile and visibility of the graduate programs at a national level to attract more domestic graduate students.
- Seek strategic hires to increase interactions among departmental faculty.

**Commendations**

The students that we met during the visit were knowledgeable and enthusiastic about their research. In addition, they had a good understanding of how the work they were doing fit in the over-all research activities of the profession. They also had a well-defined vision of their future career paths based on a critical review of their options.

PhD students are encouraged to teach at least one course.

**Overall judgment: the programs are viable.**