UCC Program Review Committee - Summary of Review

Program – Industrial and Systems Engineering

This program includes the following degrees, minors, and certificates:

- Bachelor of Science in Industrial and Systems Engineering
- Master of Science in Industrial and Systems Engineering
- Master of Engineering Management (MEM – online)
- Doctor of Philosophy in Mechanical and Systems Engineering (PhD – Systems track only)

Recommendation
This program is found to be <u>viable</u>

Date of last review – AY 2013
Date of this review – AY 2020

This review has been sent to chair and the dean. A combined response signed by the chair is attached.

Graduate council reviewed the report and concurs with the findings of the program as viable and has no further comment.

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Committee Report on the Program Review for the following programs
In the Department of Industrial and Systems Engineering at Ohio University:
Bachelor of Science in Industrial and Systems Engineering
Master of Science in Industrial and Systems Engineering
Master of Engineering Management (MEM – online)
Doctor of Philosophy in Mechanical and Systems Engineering (PhD – Systems track only)

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Site visit: November 21-22, 2019

Evaluators
1. Pratik Parikh, PhD (External), Professor, Biomedical, Industrial & Human Factors Engineering, Wright State University (Dayton, OH)
2. Timothy Anderson, PhD, Associate Professor, Geography, Ohio University
3. Lauren McMills, PhD, Associate Professor, Chemistry & Biochemistry, Ohio University

Summary
The Department of Industrial and Systems Engineering underwent an external/internal program review in November 2019. The Academic Program Review committee was comprised of Pratik Parikh (External Reviewer, Biomedical, Industrial & Human Factors Engineering, Wright State University) and two internal reviewers, Timothy Anderson (Geography) and Lauren McMills (Chemistry & Biochemistry).

The committee met with Associate Provost for Faculty and Academic Planning Howard Dewald, Senior Associate Dean for Research and Graduate Studies Shawn Ostermann, faculty, staff and students.

The overall judgement of the committee is that all 4 programs (BSISE, MSISE, MEM, and PhD-Systems) are viable.

The following seven sections, directly organized as requested by the Ohio University Academic Program Review effort, provide further details.

1. The programs as a whole
a. Is the current number and distribution of faculty sufficient to carry out the broad overall mission of the Department (Teaching; Research, Scholarship and Creative Activity; Service)?
Regarding teaching, scholarship, and service the number of faculty appears to be sufficient, as faculty performance is exemplary in each of these categories. As to research grants and grant proposals, the current mix of several full professors, no associate professors, and two assistant professors is likely not ideal. That is, the number of faculty who are actively proposing and receiving research grants is small, but the Department has little control over this circumstance as faculty stability over time has not allowed for frequent hiring.

b. Is the level of the Department's RSCA appropriate for the program given the size of the faculty and the resources available to the Department? Is the Department's level of external funding at an appropriate level?
The level of research funding via external grants appears reasonable, with industry contracts forming a large proportion of the total funding. Group 1 faculty are active in scholarship, with publications in respectable journals and conference proceedings in the field.

c. Is the level of service, outside of teaching, appropriate for the program given its size and the role that it plays in the University and broader communities it interacts with? Is the Department able to fulfill its service mission?

The level of service – and the quality of that service – performed by the faculty in the program is quite strong. Departmental faculty have served, and currently serve, on faculty senate. Student advising is especially strong, as evidenced by the development of an innovative Excel-based advising model and strong faculty involvement in student club and professional society advising.

d. Does the Department have an appropriate level of financial resources, staff, physical facilities, library resources, and technology to fulfill its mission?

The department appears to have reasonable financial resources, physical facilities, library resources, and technology. The current space plans regarding the new engineering building/facility (WUSOC) would enhance the instruction and research experience for students and faculty. However, the Department could benefit from an additional staff member dedicated to external funding in order to ease the pressure on the department chair and faculty, and to allow the faculty to pursue new opportunities and build strong externally funded research programs.

2. Undergraduate Program (BSISE)

a. Is the Department fulfilling its service role, adequately preparing non-majors for future coursework and/or satisfying the needs for general education?

The department is fulfilling its service role. Three service courses (ISE 3040, ISE 3200 and ISE 4311) are offered to non-ISE majors in the College. The department offers up to 5 sections with a total enrollment of ~160 students.

b. Is the program attracting majors likely to succeed in the program? Is the number of majors appropriate for the program? Is the program attracting a diverse group of students?

The program is attracting majors likely to succeed in the program. The number of majors is reasonable with potential for growth. The program is able to attract a diverse group of students. The proportion of female students is significantly higher than the college average. The program provides an avenue for other engineering students who are interested in a 'systems thinking' approach and want to remain in engineering.

c. Does the undergraduate curriculum provide majors with an adequate background to pursue discipline-related careers or graduate work following graduation?

The undergraduate curriculum does provide majors with an adequate background to pursue discipline-related careers or graduate work following graduation. The breadth of courses appears reasonable. There are opportunities for the programs to launch courses in the area of data analytics. Students obtain experiential learning experiences through student chapters of national organizations (via tours, guest lectures, attendance at regional conferences) and internships and co-ops. In addition to the Career and Leadership and Development Center, the college provides assistance to students with resume building, interviewing skills, and mock interviews. Opportunities for undergraduate research exist and are financially supported by the Dean's office. The department continually assesses the program and courses they offer and updates the curriculum in order to keep current. Students report faculty to be compassionate and approachable.

d. Are the resources and the number of and distribution of faculty sufficient to support the undergraduate program?

The resources and number of and distribution of faculty are sufficient to support the undergraduate program. The department has adopted innovative methods to engage direct-from-high school students and provides opportunities for them to get to know the faculty. The introduction to ISE course is taught by an ISE faculty in the first year, an ISE faculty teaches a learning community course (UC 1900) and here is an active IISE student chapter on campus. Together these help students to become engaged in the department and network with fellow students and faculty.

e. Are pedagogical practices appropriate? Is teaching adequately assessed?

The pedagogical practices appear to be appropriate. Teaching is adequately assessed through the use of end-of-semester course evaluations. Students meet with the Advisory Board without faculty present to provide feedback about the curriculum. Courses and course content are updated based on student and Advisory Board feedback. Students are comfortable speaking with the chair and faculty directly about possible improvements to courses or the curriculum. Students are also able to provide feedback during the exit interview conducted by the department chair.

f. Are students able to move into discipline-related careers and/or pursue further academic work?

The students are able to move into discipline-related careers and/or pursue further academic work. Students will either go directly to work in industry or transition to a MS program.

3. Graduate Programs (MSISE, MEM, and PhD-Systems)

a. Is the program attracting students likely to succeed in the program? Is the number of students appropriate for the program? Is the program attracting a diverse group of students?

The graduate programs (MSISE, MEM, and PhD-Systems track) are able to attract students likely to success in those programs. The admission criteria are reasonable and in line with other comparable programs in the state. The students appear to be achieving their expectations from the program and employed in a variety of positions (both industry and academic) upon graduation.

The department currently has 24 MS ISE and 21 PhD across 9 faculty; 5:1 student:faculty ratio which is reasonable. While the current number of students appears appropriate for the MS and PhD programs, the MEM program is clearly the largest driver of student enrollment in the department and tuition generator. The diversity in the MEM program appears broad, and so is the case for MSISE. However, the PhD program has a large proportion of international students and it would benefit if a few more domestic students were made aware of the exciting research opportunities that currently exist in the program. Faculty are proactive at recruiting graduate students; e.g., recruiting while at international conferences.

b. Does the graduate curriculum provide an adequate background to pursue discipline-related careers following graduation?

The wide variety of courses in the MSISE and MEM programs appears to help students prepare for discipline-related careers. The 3 certificates, with the 4th in the pipeline, provide substantial breadth for students who are already further along in their professional career. The concept of stackable certificates in the MEM program is innovative and allows students an opportunity to earn the MEM degree if need be.

c. Does the program provide adequate mentoring and advising to students to prepare them for discipline-related careers?
There appears to be reasonable mentoring and advising provided by the program coordinators, the Department Chair, and other faculty as needed.

d. Are the resources and the number of and distribution of faculty sufficient to support the graduate program?
The resources and the number of and distribution of faculty sufficient to support the graduate program appears reasonable.

e. Does the program offer appropriate financial support to graduate students?
The committee was impressed that nearly all MS and PhD students on campus have an assigned desk and computer during their stay in the program. A large proportion of graduate students receive financial support. Most MS students get a GA for over 3 semesters, while PhD students receive a guaranteed funding for at least 3 years by the department.

f. Is teaching adequately assessed?
The end-of-semester evaluation of the course appears to be sufficient to assess the effectiveness of instruction. Similar to BSISE program, the Advisory Board plays an active role in helping the faculty understand the needs of the industry and keep the program agile.

g. Are students able to move into discipline-related careers?
It appears most students are able to find discipline-related opportunities. Several PhD students are placed in academic positions

4. Areas of concern
The highly successful online MEM program is quite lean, with responsibilities being shared by the MEM Coordinator, Department Chair, and some faculty. This often results in a lag in responding to student inquiries, which can limit student experience and potentially affect future enrollment.

Although there is currently good funding from the MEM program, there may be a potential issue in the future if enrollment decreases due to increased competition in such programs and research funding is not increased to offset potential losses of revenue.

Considering that the College offers grant writing and budget support personnel, it was not clear why the proportion of externally funded federal/state grants was small in terms of the total funding received by the Department. Efforts should be made to encourage faculty to pursue externally funded grants, which may mean adjustments in workload, incentives, and other approaches as appropriate for the university.

5. Recommendations
The MEM program has several innovative techniques to delivery high quality content to their students. The MSISE program should consider employing these in the on-campus MEM program to enrich student experience.

Efforts could be made to integrate the IISE student chapter with the Columbus IISE Professional Chapter to help transition the ISE graduates into Young Professionals and members of the IISE Professional Society.

The BSISE program may want to consider designing Senior Design/Capstone projects in collaboration with other engineering programs. This would allow ISE students to experience working in an interdisciplinary environment (typical of industry).

The department should consider incorporating more courses and learning opportunities in the areas of data analytics and healthcare at both undergraduate and graduate levels. Both these fields are experiencing high demand and an increased focus could aid enrollment and visibility for the department.

The program should redouble efforts in hiring female faculty members during their next hiring cycle.

A formal mentorship program could benefit junior faculty with regard to their P&T.

The department may benefit from recruiting Postdocs and/or Research Assistant Professor to work with Group 1 faculty on grant proposals.

Students in the MSISE and PhD-Systems programs were very satisfied with the programs, but did have several suggestions. They would like the ability to test out of a class if taken previously (as part of a certificate, for example). They would prefer the writing class to be moved to the first year as a way to prepare for proposal and thesis writing. Implementation of anonymous surveys (either annually or at the end of the program) was proposed as a way for students to give feedback about the program and the advising they receive. The students are interested in the development of a peer-to peer mentoring program in order to enhance their experience.

6. Commendations
Based on the interviews with the faculty, staff, and students, the committee got the impression that the environment in the department is collegial and generally pleasant. The committee was impressed that the department supported student chapters (e.g., the IISE chapter) to promote student experience, networking, and lifelong engagement with the professional society.

Group 2 and 3 faculty continually strive to improve the curriculum and the delivery of content through innovative mechanisms; e.g., use of discussion boards, help sessions over the weekend, TED talks, online videos, weekly reflections, and realistic projects that require use of state-of-the-art software tools (e.g., SQL, Matlab, Tableau).

Kudos to the MEM Coordinator, the Department Chair, and the involved faculty for the exponential growth in the MEM online graduate program that has resulted in a significant revenue stream for the department. This has helped the department to support their graduate students financially; e.g., guaranteed support for over 3 semesters for MS and at least 3 years for PhD students. The committee also felt that the Excel-based advising tool for BS ISE was innovative.

7. Overall judgment
All 4 programs (BSISE, MSISE, MEM, and PhD-Systems) are viable.

Response to Program Review Report for Dept. of Industrial & Systems Engineering
Submitted on behalf of the ISE Department and the Dean of the Russ College
January 7, 2020

The ISE Department appreciates the time and attention that the reviewers gave during their visit to the department and preparation of the report. The feedback and recommendations will be helpful in improving the department.

The only correction to the information in the report relates to the comment in section 3e regarding guaranteed support for PhD students. Currently, only the first two years of funding are guaranteed (conditioned upon satisfactory performance) when an offer is made to an incoming student. At the end of the second year, students are evaluated and assuming satisfactory progress and the availability of funding, they are supported for a third year.

We will look into implementing the suggestions regarding additional support for faculty who are seeking external funding. In the short term, it won't be possible to add a staff member dedicated to external funding. However, faculty can increase their utilization of grant preparation resources provided by the College and the chair will work with faculty to do so. We agree that it is important to create a climate that encourages tenured faculty to pursue funding and connects them with relevant funding opportunities. In addition, the Russ College is in the process of finalizing a new workload policy which will determine the appropriate teaching load based on a faculty member's level of research activity and this policy may provide an additional incentive for some faculty to pursue external funding.

Regarding the online Engineering Management, we agree with the reviewers' observations that staffing to support the program as it has grown is insufficient. To address this, another faculty member was assigned at the end of Fall 2019 Semester to serve as assistant director of the program, handling administrative tasks, to allow the current director to focus on admissions and student inquiries.

Utilizing online teaching methods for on-campus graduate students will be investigated by the faculty to determine which topics would be most beneficial. This may include offering Engineering Management courses on campus, or creating new online courses that are specifically intended for on-campus students.

We will also explore the additional recommendations regarding the graduate program that were provided by current students. In particular, an annual, anonymous survey would be an excellent way to obtain useful feedback on a regular basis.

Dale T. Masel, Chair
Department of Industrial and Systems Engineering