UNIVERSITY OF WINDSOR
UNIVERSITY PROGRAM REVIEW (UPR)
REPORT ON: Industrial and Manufacturing Systems Engineering
UNDERGRADUATE AND GRADUATE PROGRAMS
January 2020

EXECUTIVE SUMMARY

Review Preparation

In preparing this document, the Program Development Committee reviewed the following: Industrial and Manufacturing Systems Engineering's Self-Study (SS) (2014-2015), the report of the external reviewers (ER) (December 2018), the response from the Head (HR), (May 2019), and the response from the Dean (DR) (May 2019) to the above material. The external reviewers were: Dr. Remon Pop-Iliev, Faculty of Engineering and Applied Science, University of Ontario Institute of Technology (UOIT), Dr. Leslie Monplaisir, Department of Industrial and Manufacturing Engineering, Wayne State University (WSU); and, Dr. Bharat Maheshwari, Odette School of Business, University of Windsor.

Undergraduate and Graduate Programs

At the Undergraduate level, the Department offers a Bachelor of Applied Science in Industrial Engineering, a Bachelor of Applied Science in Industrial Engineering with Minor in Business Administration, and an Honours Certificate in Industrial and Management Engineering.

At the graduate level, the Department offers a Master of Applied Science (MASc) in Industrial Engineering, a Master of Engineering (Meng) in Industrial Engineering (with/without co-op/internship), and a Multi-Disciplinary Doctor of Philosophy (PhD) in Industrial and Manufacturing Systems Engineering.

Enrolments

Undergraduate

	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Full-Time	123	119	119	105	
Part-Time	13	14	13	12	

Graduate

	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
MASc Full-Time	8	8	12	17	
MASc Part-Time	2	1	1	1	
MEng Full-Time	48	102	129	174	
MEng Part-Time	2	1	1	0	
PhD Full-Time	24	22	24	15	
PhD Part-Time	1	2	1	2	

Human Resources

Faculty/Instructors (Industrial Engineering faculty members within MAME)

Tenured/Tenure-Track Faculty Members	13
Cross-appointed Faculty Members	2
Limited Term Appointments	2
Faculty members involved in graduate program delivery	15 (including two cross-appointments)

Full/Part-Time Staff (within MAME)

Graduate Secretary	1
Head Secretary and Undergraduate Secretary	1
General Secretary	1

FINAL ASSESSMENT REPORT (with Implementation Plan)

Significant Strengths of the Programs

The programs are delivered by dedicated and accomplished faculty members, with active research programs, in the new CEI building which boasts state-of-the-art teaching, learning and research facilities, including experiential learning spaces such as "laboratories for a wide range of industrial and manufacturing technologies, as well as advanced industrial-scale manufacturing facilities". (ER, p.20, 25) Experiential or hands-on learning opportunities are well integrated into the curriculum of the various programs. (ER, p. 23)

The joint BASc/MASc program is an innovative option that permit students to obtain both degrees in five years by treating "the educational process through the BASc to the MASc degree as a single coherent integrated whole". (ER, p. 14)

Opportunities for Program Improvement/Enhancements

The External Reviewers were concerned with the reliance on Special Topics courses at the graduate level, due to the growth in enrolment and the demand for new courses in areas of interest to students, noting that "[t]his practice seems counterproductive to the desired goal of the curriculum to reflect the current state of the discipline or area of study in a comprehensive, standardized, and more controlled manner." The Reviewers suggested that these be converted, as appropriate, to stand-alone courses and that strategic course planning be a priority. (ER, p.13; DR, p.1) The External Reviewers were also concerned with what appeared to be a lack of multi-disciplinarity in the Multidisciplinary PhD program. (ER, p.20)

Since the drafting of the Self-Study (2014-2015), "[t]he Industrial Engineering program has gone through major changes […]–all in an effort to improve the quality of the program. This included a number of new faculty hires, staff hires, curriculum revision process currently underway, modernization of the labs and ensuring that the students get more of a well-rounded education including hands-on, communications, leadership, and entrepreneurship skills." The latter continues to be the impetus and basis for program improvement for the area. (DR, p. 2)

Other opportunities for program improvements are captured in the recommendations listed below.

IMPLEMENTATION PLAN

Recommendations (in priority order)

(Final recommendations arrived at by the Program Development Committee, following a review and assessment of the External Reviewers report, the response from the Department Head, and the Dean's response.)

<u>Recommendations for Graduate and Undergraduate Programs</u>

Recommendation 1: That the Program submit learning outcomes and assessment methods for each of its undergraduate and graduate courses that clearly correspond to the University's stated "Characteristics of a University of Windsor Graduate". *[Program LOs were submitted in the Self-Study and are included in the February 2020 Senate package]*

Agents: AAU Council, Head, CTL

Completion by: Next Cyclical Review (2019-2020)

A) Recommendations for Improving Graduate Program(s):

Recommendation 1: That Special Topics graduate courses that have been offered multiple times in the past and that cover material relevant for the majority of enrolled students be converted into standalone courses.
Agents: AAU Council, Head
Completion by: Next Cyclical Review (2019-2020)

Recommendation 2: That the number of multidisciplinary PhD research topics be increased, in accordance with the name of this degree, so that enrolled PhD students could pursue their research under joint supervision of a multidisciplinary team of graduate faculty members specializing in the relevant disciplines.
Agents: AAU Council, Head
Completion by: Next Cyclical Review (2019-2020)

B) Recommendations for Improving Undergraduate Program(s):

Recommendation 1: That the Department, in collaboration with other Departments in Engineering and the Dean of Engineering, consult with the Department of Mathematics and Statistics about creating a specific lab or tutorial section for Engineering students, where the emphasis would be on the engineering applications of the theoretical knowledge learned in lectures.
Agents: Head, Heads of Engineering Departments, Dean of Engineering, Department Head of Mathematics and Statistics,
Completion by: Next Cyclical Review (2019-2020)

Recommendation 2: That the Introductory Management Information Systems course (MSCI-2130) be taken in second or first year, alternatively, if they cannot find space in the stack, the department could work with business to allow a higher course on information systems. One such course could be "IT Project Management MSCI-4200." If the enrolments are high enough a new course e.g. "MIS for Engineers" can be developed (MSCI-4XXX).
Agents: AAU Council, Head
Completion by: Next Cyclical Review (2019-2020)

Recommendation 3: The 12 Graduate Attributes as defined by the CEAB and the respective continual improvement outcome-based reporting system became officially mandatory since the academic year 2014/2015. To prepare better for the upcoming accreditation visit of the Industrial Engineering program in 2021, immediately create a solid foundation for preparing both the institution and its faculty members for demonstrating the implementation of the CEAB system. First, in consultation with the programs' Industrial Advisory Board (if any), the curricula of the Industrial Engineering programs should be carefully revisited, enhanced and/or overhauled in some cases with a paramount objective to facilitate, enable, and prepare its graduating engineering students for a smooth transition from the classroom to the workplace, i.e., to create graduates with readily implementable relevant industrial engineering knowledge, practical skills, and competencies. This complex activity should at least include, but is not limited to the following 11 steps:

1) Faculty members/course instructors should be guided through a mandatory workshop that will clarify how to deliberately embed graduate attributes at a desired level of development (I,D,A) into the individual courses they teach while maintaining the consecutive sequence of ever- increasing "spines" of graduate attribute levels throughout the 8 semesters of study.
2) Conversely, the indicators of graduate attributes that describe what the students will be able to do, the level of complexity at which they will do it, and the conditions under which learning will be demonstrated should be discussed and adopted.

3) A unique continual improvement system that will include plans for data collection, reporting and periodic review cycles, has to be devised, developed, and implemented.
4) Two crucial documents should result from these consultations for each undergraduate engineering course offered: a modified version of a Course Outline/Syllabus and another document referred to, for example, as "Course Dossier," which actually should represent a document summarizing the quality of the assessed learning outcomes per entertained graduate attribute for each offering of a course.
5) Both documents mentioned above should be designed, developed and converted into a uniform template format that should be uploaded and archived in an in-house maintained digital system that could be referred to, for example, as ECRS (Engineering Course Repository System).
6) Building a database including the documents above will prove to be extremely beneficial for the preparations of CEAB accreditation visits.
7) To facilitate data collection the Course Outlines should include mandatory tables clearly indicating the relationships between course grade percentages and particular portions of course assessment tools for each graduate attribute entertained in the course.
8) The designated course instructors should be responsible to keep these documents up to date for each offering of the course and at all times.
9) To further assess the depth and breadth of the engineering knowledge and the practical skills by which the Industrial Engineering graduates are being equipped with, especially in relevant and key areas of their fields of study or specialization, seeking feedback from the industrial sectors that employ them through survey questionnaires is strongly recommended. Feeding this feedback back into the periodical cyclical curriculum reviews is strongly recommended.
10) All the activities above related to the CEAB graduate attributes outcome-based accreditation reporting system should be discussed and agreed upon through collegial consensus within the framework of the respective curriculum committees responsible for each course and as such represent an integral part of the respective course descriptions found in the Academic Calendar.
11) All faculty and teaching assistants need to be trained in the CEAB process for assessment of learning outcomes and how to use assessment results to improve courses.

[ER Recommendation 4]

Agents: AAU Council, Head, CTL

Completion by: Next Cyclical Review (2019-2020)