

**UNIVERSITY OF WINDSOR**  
**UNIVERSITY PROGRAM REVIEW (UPR)**  
**REPORT ON: Mechanical, Automotive, and Materials Engineering**  
**GRADUATE AND UNDERGRADUATE PROGRAMS**  
 March 2018

**EXECUTIVE SUMMARY**

**Review Preparation**

In preparing this document, the Program Development Committee reviewed the following: Mechanical, Automotive, and Materials Engineering’s Self-Study (SS) (2012/2013), the report of the external reviewers (ER) (February 2016), the response from the Head (HR) (April 2017), and the response from the Dean (DR) (December 2017) to the above material. The external reviewers were: Dr. Georges Kipouros, Department of Chemical and Biological Engineering, University of Saskatchewan, Dr. George Knopf, Department of Mechanical & Materials Engineering, University of Western Ontario, and Dr. S. Holger Eichhorn, Department of Chemistry and Biochemistry, University of Windsor.

**Undergraduate and Graduate Programs**

At the undergraduate level, the Department offers a Bachelor of Applied Science in Mechanical Engineering, a Bachelor of Applied Science in Mechanical Engineering with Aerospace Option, a Bachelor of Applied Science in Mechanical Engineering with Automotive Option, a Bachelor of Applied Science in Mechanical Engineering with Environmental Option, and a Bachelor of Applied Science in Mechanical Engineering with Materials Option.<sup>1</sup> The Department also offers a degree completion pathway for the Bachelor of Applied Science in Mechanical Engineering, the Bachelor of Applied Science in Mechanical Engineering with Automotive Option, Bachelor of Applied Science in Mechanical Engineering with Environmental Option, and the Bachelor of Applied Science in Mechanical Engineering with Materials Option specifically designed for Graduates of St. Mary’s University Diploma of Engineering. An articulation agreement for graduates of St. Clair College’s Mechanical Engineering Technology Automotive Product Design program provides a pathway into the Bachelor of Applied Science in Mechanical Engineering with Automotive Option.

The Department participates in the Bachelor of Engineering Technology, administered by the Dean’s Office, through the delivery of a General Stream and a Mechanical Engineering Stream.

At the graduate level, the Department offers a Master of Applied Science in Engineering Materials, a Master of Engineering in Engineering Materials, a PhD in Engineering Materials, a Master of Applied Science in Mechanical Engineering, a Master of Engineering in Mechanical Engineering (with/without Co-op or Internship Option), a Master of Engineering in Mechanical Engineering with Automotive Option (with/without Co-op or Internship Option), a PhD in Mechanical Engineering, and an international Masters in Automotive Engineering with Politecnico di Torino (dual degree Master of Applied Science/Laurea Magistrale).

**Enrolments**

**Undergraduate**

	<b>Fall 2013</b>	<b>Fall 2014</b>	<b>Fall 2015</b>	<b>Fall 2016<sup>2</sup></b>	<b>Fall 2017</b>
<b>Full-Time</b>	461	527	578	692 (573)	650 (533)
<b>Part-Time</b>	89	120	128	182 (170)	155 (144)

<sup>1</sup> In February 2016, Industrial Engineering was folded into the Department of Mechanical, Automotive, and Materials Engineering, adding the following programs to its offerings as of Fall 2016: a Bachelor of Applied Science in Industrial Engineering, a Bachelor of Applied Science in Industrial Engineering with Minor in Business Administration, a post-undergraduate Honours Certificate in Industrial and Management Engineering, a Master of Applied Science in Industrial Engineering, a Master of Engineering in Industrial Engineering (with/without Co-op or Internship Option), and a multi-disciplinary PhD in Industrial and Manufacturing Systems Engineering.

<sup>2</sup> Industrial program enrolment numbers included as of Fall 2016. Numbers in brackets represents enrolment in programs, minus Industrial.

## Graduate

	Fall 2013	Fall 2014	Fall 2015	Fall 2016 <sup>3</sup>	Fall 2017
Full-Time	215	256	332	566 (434)	821 (656)
Part-Time	14	12	6	14 (10)	8 (5)

## Human Resources

### Faculty/Instructors

Tenure/tenure-track faculty	35
AAS Learning Specialist III	1
Limited-term appointments	2
Faculty members involved in graduate program delivery	34

### Full/Part-time Staff

General Secretary	1
Engineering Technologists	2.5
Manufacturing Engineering Systems Technologist	1
Mechanical Engineering Technologists	1.75
Secretary to the Head and Graduate Secretary	1
Secretary to the Head and Undergraduate Secretary	1

## FINAL ASSESSMENT REPORT (with Implementation Plan)

### Significant Strengths of the Programs

The Department of Mechanical, Automotive and Materials Engineering offers high quality undergraduate and graduate programs, strengthened by experiential learning opportunities, including capstone projects, co-op placements, and exceptional hands-on lab experiences. (ER, p.2,3,6) Faculty are equally dedicated to developing their research programs and scholarly activities, and highly engaged in teaching and continual curriculum development. (ER p.3,6) “[I]ndividual faculty members have incorporated new trends in the delivery of course materials including *team teaching* of large 1<sup>st</sup> and 2<sup>nd</sup> year courses and *flipped classroom* approach to 3<sup>rd</sup> and 4<sup>th</sup> year courses.” (ER,p3)

### Opportunities for Program Improvement/Enhancements

The External Reviewers commented on feedback from students that more and earlier experiential learning opportunities should be imbedded in the curriculum. (ER, p.7) It was “suggested that the courses during the first two years of the program should be enhanced with more hands-on activities, strong connection between the concepts taught and real-world engineering applications, and experiential learning opportunities.” (ER, p.3)

To address the difficulty in securing sustainable graduate student funding, the External Reviewers suggested faculty establish research groups that can compete for large-scale national, international, and industrial research funding. (ER, p.6) (See recommendation 4 below.)

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

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<sup>3</sup> Industrial program enrolment numbers included as of Fall 2016. Numbers in brackets represents enrolment in programs, minus Industrial.

## 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 Head's response, and the Dean's response.)*

**Recommendation 1:** That the Department submit curriculum maps for each of its programs, program-level learning outcomes for its Industrial Engineering undergraduate and graduate programs, and course-level learning outcomes and assessment methods for each of its courses that clearly correspond to the program-level learning outcomes.

**Agents:** Department Council, Head, CTL, Vice-Provost, Teaching and Learning

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 2:** That the Department consider replacing the co-op program with an internship option that involves 12-month or two 6-month placements, enabling most students to graduate in 44 months and reducing the need to offer core courses more than once per year. *[PDC understands that the current co-op structure allows for 1-term, 2-term or 1-year placements; however, the Department is asked to report specifically on the feasibility and advisability of discontinuing the current structure and implementing a 1-year internship model only as recommended by the External Reviewers.]*

**Agents:** Head, Dean, Co-operative Education Services

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 3:** That the Department and Faculty of Engineering consider and report on the advisability of restricting the MASc degree to a thesis-based program only and adding the non-thesis major paper option to the MEng program.

**Agents:** Head, Dean

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 4:** That the Department seek additional sources of external research funding to secure sustainable graduate student funding. In particular, that the Department report on efforts to seek more industrially-sponsored and larger multi-investigator grants, and to establish viable targeted research groups, clusters or centres that can compete for national/international grants and large-scale industrial research projects.

**Agents:** Head, faculty members

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 5:** That the Department review its teaching commitments and workloads and report on a plan to support individual faculty members, particularly early-career faculty, in building and increasing their research activities and academic scholarship.

**Agents:** Head, Dean

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 6:** That the Department develop and report on a plan to strengthen faculty member interactions with alumni and the local community. Alumni and community support will raise the Department profile and increase recognition of individual faculty members (*i.e.* quality and performance indicators).

**Agents:** Head, faculty members

**Completion by:** must be addressed in the 2019/2020 Self-Study Report

**Recommendation 7:** That the Department, working with the Faculty Dean, report on a plan to effectively and efficiently manage space and human resource needs, particularly technical staff needs.

**Agents:** Head, Dean

**Completion by:** must be addressed in the 2019/2020 Self-Study Report