



**FINAL ASSESSMENT REPORT**  
**Executive Summary**  
**May 2018**  
**Bachelor of Engineering in Manufacturing Engineering**  
**Program Review**  
**Dean: Dr. Tarlochan Sidhu**

Under UOIT's Quality Assurance Framework, all degree programs are subject to a comprehensive review every eight years to ensure that they continue to meet provincial quality assurance requirements and to support their ongoing rigour and coherence.

On the completion of the program review, the self-study brief together with the reviewers' report and the assessment team's response are reviewed by the appropriate standing committee of Academic Council, and are subsequently reported to Academic Council, the Board of Governors and the Quality Council.

In academic year 2016-2017 a program review was scheduled for the Bachelor of Engineering in Manufacturing Engineering.

This is the second program review for this program and the internal assessment team is to be commended for undertaking this assignment in addition to an already challenging workload and within a very tight timeline. The following pages provide a summary of the outcomes and action plans resulting from the review. A report from the program outlining the progress that has been made in implementing the recommendations will also be put forward in eighteen months' time.

**External Reviewers:** Dr. Andrew Warkentin (Dalhousie University) and Dr. Les Jozef Sudak (University of Calgary).

**Site Visit:** 6 – 7 November, 2017

Manufacturing engineering was the first engineering program at UOIT. This rich program allows student to learn and experience state of the art topics in manufacturing engineering.

The program curriculum is designed based on the academic requirements for this engineering discipline and based on the needs of manufacturing industries including courses related to manufacturing processes, manufacturing systems, and the important role of manufacturing in the entire product development cycle.

This program also has an optional management program, which is taken between the third and fourth year of the regular program.

### **Significant Strengths of the Program**

- All the faculty members in Manufacturing Engineering have strong research and industry background.
- Most of the faculty members in the Manufacturing stream have NSERC funding and/or industrial funding.
- The faculty members in Manufacturing Engineering are well recognized in their field of research and all of them are registered professional engineers.
- Having a laptop loaded with any software that the students need for their study.
- Hands-on experience through state-of-the-art laboratories.
- Valuable co-op and internship opportunities for students.

### **Opportunities for Program Improvement and Enhancement**

- Lack of machine shop labs especially in the 1st and 2nd years of study, which delays the exposure of manufacturing students to the application of real life manufacturing equipment.
- Lack of space for undergraduate students to work on their capstone projects, participate in social activities and space for study.
- Lack of space for storage of Capstone Design projects.
- Finding unique ways to advertise the program.
- Examining the use of more technical elective courses in the program for students.
- The current student to faculty ratio is high.

### **The External Review**

The site visit took place on November 6 and 7, 2017. Drs. Andrew Warkentin (Dalhousie University) and Les Jozef Sudak (University of Calgary) met with members of the Faculty as well as key stakeholders at the University, including the Dean, Associate Dean in FEAS, Department Chair, Associate Dean of Quality Enhancement, and a number of faculty, staff, and students.

### **Summary of Reviewer Recommendations and Faculty Responses**

#### **Recommendation 1**

##### ***Faculty Complement***

*The Department of Automotive, Mechanical and Manufacturing Engineering has a very high student faculty ratio. UOIT should consider increasing the number of full time faculty in this department to bring it more inline with national averages for mechanical engineering programs.*

##### **Response**

The Faculty notes that in the recent academic plan and budget submission, a request has been made to hire an additional six faculty members over the coming two years to bring the student to faculty ratio in line with the national average.

#### **Recommendation 2**

##### ***Administration***

- (a) The Manufacturing Program appears to be administrated by the Chair of the Department of Automotive, Mechanical and Manufacturing Engineering Department along with 9 other programs. This is a tremendous load on the Chair and may result in the Manufacturing Engineering Program not receiving the attention it deserves. It is recommended that a Program Coordinator or Assistant Chair be assigned to the program. This person would act as a champion for the program,*

*develop a strategic plan, be responsible for promoting the program, oversee academic advising etc.*

- (b) Academic advising is carried out by staff rather than faculty as is the case in most engineering program. Only engineering faculty have the expertise to advise students on academic issues within an engineering program. It is recommended that faculty take over this responsibility.*
- (c) Currently the Co-op program is administrated outside the Faculty of Engineering. If the Co-op program is to be considered an academic activity, then it should be overseen by a member of the faculty of Engineering.*

### **Response**

- (a) The faculty agrees that four programs and one specialization is too many programs for a single department. The faculty has proposed to create an additional department in the next few years.*
- (b) As the structure of the faculty matures, it is expected that the academic advising of students will eventually be done within the departments rather than centrally.*
- (c) The faculty has hired a Co-op and Internship Officer to be housed within the Faculty of Engineering, as well as planned for increased faculty involvement within the Faculty Academic Plan.*

### **Recommendation 3**

#### ***Space and Facilities***

*Space was universally recognized by students, faculty and staff as an issue at UOIT. While improvements have been made in this area, lack of space is having a negative impact on student experience, mental health and academic performance and should be remedied as soon as possible. Specifically:*

- (a)*
  - i. Lack of sufficient classrooms means that lectures or labs must be scheduled from early in the morning until the evening hours. Furthermore, most test and exams have to be scheduled on the weekend. This issue coupled with the large number of students that commute to UOIT is particularly problematic.*
  - ii. Students struggle to find space on campus to do their homework or relax between lectures and labs.*
  - iii. Students do not have a lounge/homeroom where they can participate in social activities.*
  - iv. There is no space for teaching assistants to carry out office hours without having to work in common areas.*
- (b) It is difficult to find space for students to work on their capstone projects.*
- (c) In addition, manufacturing student should have access to and training on commonly used machine tools as early as possible in their program. This experience is imperative for students that are specializing in the science of making things.*

### **Response**

- (a) The faculty notes that the university is aware of the space issue and the increased need for classrooms, study space, TA space, and student space.*
- (b) The Design and Innovation Studio has recently been developed to provide students space to work on their projects, specifically Capstone Design Projects, however more space is required to ensure that the students have the best possible experience.*

- (c) The faculty will work with ACE to make the existing machine shop readily accessible to undergraduate students along with the provision of proper safety training. In the long term, a dedicated space for students to work on their projects with small tools is required.

#### **Recommendation 4**

##### ***Promotion and Branding***

*The Manufacturing Program seems to be having difficulty attracting students even though the programs graduate are highly employable and small class sizes make one-on-one interactions with instructors feasible. It was suggested several times in our interviews that it has an image problem. Potential student may have the perception that the manufacturing sector is in decline, that they will have to work in a factory or simply do not know what a manufacturing engineer does. These perceptions may have been partially responsible for the fact that UOIT has the only remaining manufacturing program in Canada. Interestingly, industrial engineering programs which are similar to manufacturing programs are relatively healthy in Canada. It is therefore recommended that UOIT consider renaming the program and perhaps eliminate the word manufacturing from the title. Furthermore, the manufacturing program needs to promote itself separately from the rest of the engineering programs at UOIT. Potential students must be educated on the possible career opportunities in manufacturing, made aware of the importance and benefits of manufacturing to society and excited by the latest manufacturing technologies. Manufacturing program alumni and industrial partners should be engaged and encouraged to help with promotion. It is also worth noting that only about 13% of manufacturing students come from outside of Ontario. Given that this program is unique in Canada it would seem that there could be substantial benefits to promoting the program in other provinces.*

##### **Response**

The program has considered renaming the program in the past, however they instead would like to focus on making the program more attractive to applicants through mandatory co-op and internship opportunities. They feel that being the only Manufacturing Engineering program in Canada is an advantage that should be focused on and celebrated.

#### **Recommendation 5**

##### ***Curriculum***

- (a) The Manufacturing Program is not well differentiated from the Mechanical Engineering Program until third year. This may be one of the reasons that many students transfer out of the program in second year and that average course evaluations are at their lowest level in second year. It is recommended that the second year of the manufacturing program be different than the Mechanical Engineering program. Perhaps an introductory course on manufacturing processes with hands on training with machine tools would entice students to stay in the program.*
- (b) The Manufacturing Program only has two technical electives. It is recommended that the number of technical electives be increased to at least three.*

##### **Response**

- (a) The faculty has indicated that the Manufacturing Program Curriculum Committee and related faculty members in the program will look into this idea and revise the curriculum if needed.
- (b) The faculty is currently in the process of adding two electives specific to Manufacturing Engineering. In addition, there is consideration being given to changing Mechatronics course to

Industrial Automation for the Manufacturing program, which will benefit the students and make the course more relevant to the program.

### Plan of Action

The table below presents a timeline of the actions planned to address the recommendations from the external report.

<b>Proposed Action</b>	<b>Timeline</b>	<b>Person/Area Responsible</b>
Addition of six faculty members to the Faculty of Engineering to help improve the faculty to student ratio.	<b>Fall 2020</b>	<b>Provost's Office/FEAS</b>
Move the Manufacturing Engineering program into newly created, smaller department.	<b>Fall 2020</b>	<b>FEAS Faculty Council/Provost Office/ Academic Council</b>
Move academic advising to a departmental model as opposed to centralized.	<b>Fall 2020</b>	<b>FEAS</b>
Make ACE's machine shop available to undergraduate students and provide the appropriate safety training.	<b>Fall 2019</b>	<b>ACE/FEAS</b>
Implement mandatory co-op and internship courses within the program.	<b>Fall 2020</b>	<b>FEAS</b>
Manufacturing program curriculum committee to review curriculum to see if there is a way to differentiate the second year curriculum.	<b>Fall 2019</b>	<b>Manufacturing program curriculum committee.</b>
Increase the number of technical electives offered to three.	<b>Fall 2019</b>	<b>Manufacturing program curriculum committee.</b>

**Due Date for 18-Month Follow-up on Plan of Action: May 2019**

**Date of Next Cyclical Review: 2023-2025**