Curriculum Review – Public Report

Department of Mechanical and Manufacturing Engineering

Schulich School of Engineering

http://schulich.ucalgary.ca/

May, 2017

1. Context:

The Mechanical and Manufacturing Engineering Department offers a Bachelor of Science in Mechanical Engineering with minors in Mechatronics, Manufacturing Engineering or in Petroleum Engineering (offered in conjunction with the Department of Chemical and Petroleum Engineering). In addition, the Department of Mechanical and Manufacturing Engineering offers a specialization in Biomedical Engineering and a specialization in Energy and Environment which can be combined with the regular four year Mechanical Engineering degree. The Mechanical Engineering program continues to be one of the most popular programs within the Schulich School of Engineering, attracting considerable second year applicants.

The Mechanical Engineering program is a fully accredited program. The primary objective of the Mechanical Engineering undergraduate program is to provide our students with an engineering education commensurate with academic background and qualifications necessary for the practice of the engineering profession. This is achieved through a 4 year, 8 term degree program consisting of a one year common curriculum in engineering for all students followed by a more specialized three year program in Mechanical Engineering. Thus, the graduating student is provided with a general engineering education plus appropriate in-depth knowledge of selected areas in Mechanical Engineering.

To achieve this objective, the program includes a broad and appropriate education in the physical science, mathematics, computer science and the principles of engineering science and design. In addition, the students are provided with the opportunity to study courses designed to improve societal awareness, communication and business skills and to make them aware of the pervasive impact of technology on society.

In 2016-2017, the Department of Mechanical and Manufacturing Engineering engaged in a curriculum review process for the Bachelor of Science Program. The curriculum review process is a critical component and is focused on continuing development. Through this exercise, data has been gathered that examines graduate attributes of individual courses as well as the integration of the courses to form a comprehensive program of study. The mapping process provided insight to gauge the extent to which individual courses align with the goals set out by the Canadian Engineering Accreditation Board. From the analysis of the various data, recommendations and an action plan have been developed to guide ongoing improvement of the program.

3. Guiding questions:

In January 2017, the Mechanical and Manufacturing Engineering curriculum review team engaged in a fruitful, collaborative discussion to determine the critical questions and concerns that would be needed as part of the review process. Input was also provided by members of the Mechanical and Manufacturing Engineering Industrial Advisory Committee at a May 23, 2017 meeting. The team identified the following three guiding questions for the review process:

1. How can we make the Mechanical Engineering program innovative?
2. Where are the bottlenecks in the program and how do we resolve them?
3. How do students learn about academic integrity? Are we doing enough and the right things in this area?

8. Action Plan:

The guiding questions described in Section 3 were used as a starting point for the action items. The first two focus on the BSc in Mechanical Engineering curriculum: i.e., (1) making it more innovative, and (2) making it more efficient/effective. The third focuses on academic integrity. The preliminary review of the program described in this document reveals that BSc in Mechanical Engineering curriculum is not well aligned. More specifically, the intended learning outcomes for most courses are predominately at the surface level (i.e., "remember", "comprehend", "apply"); and, teaching and learning activities and assessment tasks predominantly focus on declarative knowledge (i.e., the predominant assessment technique used is the written exam or assignment consequently students are less involved in actively putting knowledge to work as would be expected in a professional program). The action items associated with the first two guiding questions are intended to address these issues by improving constructive alignment of the BSc in Mechanical Engineering curriculum. The goal is to identify more innovative and effective ways to deliver the curriculum that are aligned with the program outcomes. To ensure the delivery of the action items set out in the plan an annual retreat will be formed to review the progress and determine the next steps.

Recommendations for Guiding Questions #1 and #2			
Recommendation	**Action Item**	**Implementation Timeline**	**Lead Responsible**
Improve constructive alignment of BSc in Mechanical Engineering program	Identify main concept domains for the BSc in Mechanical Engineering Program	Fall 2017	Associate Head Undergraduate, Faculty, Department Curriculum Committee
	Identify the key threshold concepts in each concept domain and their mapping to courses	Fall 2017 and Winter 2018	Associate Head Undergraduate, Faculty, Department Curriculum Committee
	Review intended learning outcomes in the context of the threshold concepts and the CEAB graduate attributes and their link to teaching and learning activities and assessment techniques	2018/2019 academic year	Associate Head Undergraduate, Faculty, Department Curriculum Committee

As noted, the third guiding question relates to academic integrity. We see this as being tightly linked to the action items related to curriculum alignment, as "ethics and equity" is a core

graduate attribute of the BSc in Mechanical Engineering program (CEAB graduate attribute 3.1.10).

Recommendations for Guiding Question #3			
Recommendation	**Action Item**	**Implementation Timeline**	**Lead Responsible**
Increase the emphasis on academic integrity	Identify intended learning outcomes for the "ethics and equity" graduate attribute	2018/2019 academic year	Associate Head Undergraduate, Faculty, Department Curriculum Committee
	Map the intended learning outcomes to BSc in Mechanical Engineering course(s) and appropriate develop teaching and learning activities and assessment techniques	2018/2019 academic year	Associate Head Undergraduate, Faculty, Department Curriculum Committee