Instructor Guide

Enabling the Canadian Engineering Grand Challenges for Educators

Overview

“*Enabling the Canadian Engineering Grand Challenges for Educators*” was created to support engineering educators in actively engaging students in developing awareness of the complex sociotechnical challenges in the Canadian context, and to support engineering instructors in preparing undergraduate engineering students with the necessary leadership and sociotechnical knowledge, skills and attitudes to solve these large complex challenges and facilitate impactful change.

The information and activities are contextualized to the six Canadian Engineering Grand Challenges (CEGC) developed by Engineering Deans Canada (<https://engineeringdeans.ca>) in 2019. The six CEGC capture the United Nations 17 Sustainable Development Goals (SDG) in a way that is unique to the engineering context in Canada.

The modules are designed for to allow instructors to supplement courses or workshops and complement learning material for their students. For each CEGC, foundational material, activities, case studies and exercises are provided. The modules provide a background to the CEGC themselves and are enhanced by providing a case study that presents a summary of the sociotechnical challenges in a specific Canadian community or city. The case studies are supported by learning activities to identify problems, address challenges and communicate potential solution ideas. Embedded within this approach are frameworks to build capacity for engineering leadership and sustainability. Each module is available in English and French.

Structure

The course is structured with four major components, consisting of a sequence of 3 content modules and a Toolkit for Educators. The components are:

* *Module 1: Canadian Engineering Grand Challenges (CEGC)*
* *Module 2: Cities and Communities*
* *Module 3: Engineering Leadership*
* *Toolkit for Educators*

Learning Objectives

The overall learning objects for the series of modules and activities are for students to:

1. Develop awareness of sociotechnical engineering grand challenges in the context Canadian Engineering Grand Challenges (CEGC).
2. Explore the complexity of CEGC through the review of case studies based on current issues in Canadian cities.
3. Explore the concept of the leadership roles that an engineer can play in creating solutions to complex roles of engineers as sociotechnical leaders engineering leadership.
4. Identify and develop skills and attitudes to advance their own leadership development.

Lesson Structure

The structure allows for instructors to explore the CEGC and development of leadership skills, first by providing introductory background to CEGC and Engineering Leadership. Following the background information delivery, instructors can identify a case study for one or several cities or communities for each CECG, and work through the lesson activities for the case study.

The content provided in Modules 1, 2 and 3 provide the background for lessons that an instructor can incorporate into their courses as stand-alone exercises or to enhance discussion as they relate to exploring the engineer’s role in addressing complex sociotechnical challenges such as the CEGC.

The following lessons have been developed that an instructor can use or modify to suit their specific requirements:

* *Lesson 1: Exploring the Canadian Engineering Grand Challenges* ***(15 minutes)***
* *Lesson 2: Examining CEGC through City and Community Case Studies* ***(15 minutes)***
* *Lesson 3: Self Leadership – Exploring your Personal Values and Examining your Values in the Context of the CEGC.* ***(45 minutes)***

The lessons are designed to be completed in sequence, but the instructor can modify or adjust to use any components to fit within other material they are delivering. Lessons 1 and 2 require approximately15 minutes to complete. Lesson 3 requires approximately 45 minutes to complete. These times can vary depending on the level of interaction or discussion desired.