

**MODULE 1:** Communication and Terminology for Professional Licensing

**TOPIC 4:** Academic Requirements and the PEO Interview Process

**LEARNING OUTCOMES:**

At the end of this lesson, participants will be able to:

- ◆ relate theoretical knowledge to their own practical engineering practice within the context of the PEO interview process



<b>TOPIC</b>	<b>SKILLS</b>	<b>CLB COMPETENCIES AREA</b>	<b>COMPETENCIES</b>	<b>PRE-TASKS</b>	<b>TASKS</b>	<b>POST-TASKS</b>
<ul style="list-style-type: none"> <li>◆ Academic Requirements and the PEO Interview Process</li> </ul>	<ul style="list-style-type: none"> <li>◆ Reading</li> <li>◆ Listening/ Speaking</li> </ul>	<ul style="list-style-type: none"> <li>◆ unformatted text</li> <li>◆ exchanging information</li> </ul>	<ul style="list-style-type: none"> <li>◆ associate technical terminology with engineering disciplines and principles</li> <li>◆ scan text for specialized terminology</li> <li>◆ describe theoretical knowledge as applied in practical engineering practice</li> <li>◆ gain knowledge of educational terminology and content of Canadian engineering undergraduate programs</li> </ul>		<ul style="list-style-type: none"> <li>◆ role-play an interview with the PEO Experience Requirements Committee (ERC) relating theoretical knowledge to practical experience</li> <li>◆ practise answering interview questions</li> </ul>	<ul style="list-style-type: none"> <li>◆ create compound nouns</li> <li>◆ use verbs with appropriate nouns (collocation)</li> <li>◆ keep record of terminology usage</li> </ul>

**Facilitator's Guide for Module 1****Topic 4: Academic Requirements and the PEO Interview Process****FACILITATOR PREPARATION*****Content***

In order to deliver this workshop effectively, the facilitator should be familiar with the following:

- ◆ the academic content of the four engineering disciplines (see current Faculty of Engineering calendars for Ontario universities; these are generally available on university Web sites)
- ◆ knowledge of some discipline-specific terminology and compound nouns

The facilitator can enhance this lesson by providing participants with current copies of Engineering Calendars from any Ontario university. **The program descriptions in Handouts 2A and 2B are generic and cannot be assumed to be current.**

***Delivery***

As many copies as necessary of the following handouts should be made:

- ◆ Handout 1                      Engineering Principles
- ◆ Handout 2A/2B              Excerpts from Faculty of Engineering Program Descriptions
- ◆ Handout 3                      Discipline- Specific Terminology
- ◆ Handout 4                      Compound Nouns

Terminology List (optional)

Prepare the cue cards for the task and group according to discipline.

## METHODOLOGY

### *Introduction*

- (15 minutes)** 1. Elicit examples of degrees and disciplines held by participants and clarify Canadian equivalents (e.g., secondary school, post secondary, community college, undergraduate, graduate, postgraduate, degree, diploma, certificate, B.A., B.Sc., M.Sc., M.Eng., P.Eng., C.Eng., Ph.D.)

Focus on Canadian educational terminology. Try not to undertake any interpretation of participants' education qualifications.

### *Pre-Tasks*

- (30 minutes)** 1. Explain that this workshop deals with four engineering disciplines: chemical, mechanical, industrial, and electrical/electronics. Distribute Handouts 1 and 2A/2B (excerpts from a university engineering calendar). Explain that participants are looking at descriptions of four engineering programs towards a Bachelor's degree in engineering. Have the participants read the excerpts. Afterwards, ask the participants to circle the words within each description that are specific to that discipline. Participants should check and negotiate meanings of words in pairs. As a class, decide which discipline can be characterized by which of the principles listed on Handout 1.

- (15 minutes)** 2. Distribute Handout 3 and explain that the items are taken from the titles of courses offered by an Engineering Faculty at an Ontario university. Have the participants match each course with the disciplines listed above. Have participants compare their answers in pairs and then take up as a whole class.

- (20 minutes)** 3. As an extension of pre-task 2, have the participants discuss in pairs or groups how the items in the course titles reflect the principles listed in Handout 1:
1. movement and motion (mechanical)
  2. process and composition (chemical)
  3. circuits (electrical)
  4. systems integration (industrial)
- (25 minutes)** 4. In order for participants to apply theoretical knowledge to their engineering practice, instruct participants to discuss how each concept or field of study (listed in Handout 3) would be applied to engineering practice (i.e., \_\_\_\_\_ helps an engineer decide how to \_\_\_\_\_).

### **Task**

- (35 minutes)** 1. Explain to the class that they may be required to attend an interview with the PEO's Experience Requirements Committee (ERC) in order to become licensed. Applicants may be asked to show how they applied theoretical knowledge to their engineering practice. Mention that if applicants have more than five years of verifiable, acceptable experience, they will likely require this interview to avoid writing the Confirmatory Examination Program (CEP) exams. Group the participants according to discipline and distribute the cue cards accordingly. Tell the participants that they should try to answer the questions as if they were being interviewed by a PEO ERC member.

Ask the class how a PEO interview context may influence their language choices. (Optional: have the participants make up their own questions that relate theoretical knowledge with practical experience.)

As participants practise answering interview questions, the facilitator should check the content and clarity of their language.

**Post-Task**

- (20 minutes)** 1. Distribute Handout 4 and group participants in pairs. Tell them that they have five minutes to create as many compound nouns as they can! After, have the class define the nouns. Some answers can be found in the Terminology List.

**Handout 1- Engineering Principles**

The excerpts on Handouts 2A and 2B describe engineering programs offered towards a Bachelor's degree at an Ontario university. For each discipline, read the information and circle those words you believe are specific to that discipline. Work in groups to understand the meanings.

Now decide which discipline can be characterized by which principles:

- 1. movement and motion \_\_\_\_\_
- 2. process and composition \_\_\_\_\_
- 3. circuits \_\_\_\_\_
- 4. systems integration \_\_\_\_\_

## Handout 2A

### **INDUSTRIAL ENGINEERING**

(Offered by the Department of Mechanical and Industrial Engineering.)

### **UNDERGRADUATE PROGRAMS IN INDUSTRIAL ENGINEERING**

The Industrial Engineering program was established in 1958. Industrial engineering (IE) is uniquely concerned with the analysis, design, installation, control, evaluation, and improvement of socio-technical systems, in a manner that protects the integrity and health of the human, social, and natural ecologies. Industrial Engineering draws upon specialized knowledge and skills in the mathematical, physical, and social sciences, together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results obtained from complex socio-technical systems. Industrial Engineering principles enable system objectives, such as performance, reliability, maintainability, schedule adherence and cost control to be optimized.

IE is a systems integration discipline that brings together perspectives otherwise considered in isolation. Industrial Engineers define the macro problem, analyze the context of the problem from multiple perspectives, and develop a solution suitable to the holistic characteristics of the problem's context. Only after a critical macro analysis has been carried out is the IE'S repertoire of specific problem solving tools and methods invoked. IE goes beyond technological aspects of problems, taking into account psychological and organizational concerns; technology is viewed as a means rather than an end. This "systems approach" provides IEs with the tools necessary to create and maintain flexible organizations able to adapt to their environment, be it in the manufacturing, health, finance, or any other sector.

### **ELECTRICAL ENGINEERING**

(Offered by the Department of Electrical and Computer Engineering.)

### **UNDERGRADUATE PROGRAMS IN ELECTRICAL ENGINEERING**

Electrical Engineering encompasses traditional subjects, such as electrical power generation and transmission, communications, electronics, electromagnetics, and feedback control; and relatively new subjects such as electric vehicles, optical and digital communication, systems theory, microelectronics and photonics, computer technology and microprocessors.

*Adapted from the University of Toronto's Faculty of Engineering calendar.*

## Handout 2B

### **CHEMICAL ENGINEERING**

(Offered by the Department of Chemical Engineering and Applied Chemistry.)

#### **UNDERGRADUATE PROGRAMS IN CHEMICAL ENGINEERING**

Chemical Engineering is that primary engineering discipline based on the fundamental sciences of chemistry, physics, biochemistry and mathematics, in which processes are conceived, designed and operated to affect compositional changes in materials of all kinds.

The skills of the chemical engineer are necessary to the development of advanced materials, such as high-strength and reinforced plastics, the application of modern theories of surfaces and interfaces to development of biomaterials, membrane separations, and food products, and the application of high-energy sources, such as lasers and microwave plasmas in the production of semiconductors and modern electronic circuitry.

These applications of modern technology to the solution of problems in the evolution of high technology complement the more traditional role of the chemical engineer in the use of and conservation of natural resources, energy conversion, and environmental control. Chemical engineers also play an important role in the development of a healthier environment and safer and healthier industrial workplaces. They are primarily responsible for improvements in the technology evaluating and controlling hazards.

In addition to the basic sciences, chemical engineers use a well-defined body of knowledge in the application of the conservation laws, which determine mass flow and energy relations; thermodynamics, and kinetics, which determine what reactions are feasible and the rate at which they occur; and the chemical engineering rate laws, which determine limits to the transfer of heat, mass, and momentum.

### **MECHANICAL ENGINEERING**

(Offered by the Department of Mechanical and Industrial Engineering.)

#### **UNDERGRADUATE PROGRAMS IN MECHANICAL ENGINEERING**

The Mechanical Engineering profession faces unprecedented challenges and exciting opportunities to serve the needs of society. The broad disciplinary base and design orientation of the field will continue to make the skills of the mechanical engineer crucial to the success of virtually all technical systems that involve energy, motion, materials, design, automation, and manufacturing. The explosive development of lower-cost, compact, and high-speed computing hardware and software is already revolutionizing the analysis, design, manufacture, and operation of many mechanical engineering systems, which include automotive engineering, robotics, fuel alternatives, nuclear and thermal power generation, materials behaviour in design applications, transportation, biomechanical engineering, environmental control, and many others.

To address this broad disciplinary base, the education of the mechanical engineering student at the University of Toronto is built upon a foundation of mechanics, thermodynamics, fluid mechanics, control theory, dynamics, materials science, and design.

The study of these subjects requires adequate preparation in mathematics and in such fundamentals as physics and chemistry. In the final year of study, the student is free to select courses from a range of electives. The elective offerings permit the student to choose subjects compatible with individual interests in areas of high technology.

*Adapted from the University of Toronto's Faculty of Engineering calendar.*

### Handout 3

Below is a list of courses offered by the Engineering Faculty of an Ontario University towards a Bachelor's degree. Match each course with the disciplines listed above. Write the appropriate letter next to each course.

<i>M</i> ←→ <i>Mechanical</i>	<i>I</i> ←→ <i>Industrial</i>	<i>C</i> ←→ <i>Chemical</i>	<i>E</i> ←→ <i>Electrical</i>
<i>Engineering</i>	<i>Engineering</i>	<i>Engineering</i>	<i>Engineering</i>
 <b>For example: <u>M</u> Vibrations</b> 			
_____ Organizational design	_____ Circuit theory		
_____ Health care systems	_____ Facility planning		
_____ Advanced materials properties	_____ Robotics		
_____ Digital communication	_____ Thermal energy generation		
_____ Polymer science	_____ Fields and waves		
_____ Ergonomics	_____ Resource & product systems		
_____ Aerodynamics	_____ Photonics		
_____ Microprocessors	_____ Microwave Plasmas		
_____ Kinetics & dynamics	_____ Pulp & paper processes		

**FACILITATOR'S NOTES**

**Answer Key to Handout 3**

Below is a list of courses offered by the Engineering Faculty of an Ontario University towards a Bachelor's degree. Match each course with the disciplines listed above. Write the appropriate letter next to each course.

<b>M</b> ↔ Mechanical Engineering	<b>I</b> ↔ Industrial Engineering	<b>C</b> ↔ Chemical Engineering	<b>E</b> ↔ Electrical Engineering
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**For example: M Vibrations**

<u>I</u> Organizational design	<u>E</u> Circuit theory
<u>I</u> Health care systems	<u>I</u> Facility planning
<u>C</u> Advanced material properties	<u>M</u> Robotics
<u>E</u> Digital communication	<u>M</u> Thermal energy generation
<u>C</u> Polymer science	<u>E</u> Fields and waves
<u>I</u> Ergonomics	<u>I</u> Resource & product systems
<u>M</u> Aerodynamics	<u>E</u> Photonics
<u>E</u> Microprocessor	<u>C</u> Microwave Plasmas
<u>C</u> Kinetics and dynamics	<u>C</u> Pulp & paper processes

**Cue Cards**

Chemical <b>How do you conduct a chemical analysis?</b>	Chemical <b>How do you test chemical processing equipment?</b>	Chemical <b>How do you design a chemical processing plant?</b>
Chemical <b>How do you assess new technology?</b>	Mechanical <b>How do you design an instant water heater?</b>	Mechanical <b>How do you select a hydraulic actuator?</b>
Mechanical <b>How do you troubleshoot machinery?</b>	Mechanical <b>How do you test an air-conditioning system?</b>	Electrical <b>How do you design a telecommunications system?</b>
Electrical <b>How do you plan an underground cable system?</b>	Electrical <b>How do you test digital circuits?</b>	Electrical <b>How do you troubleshoot electrical faults?</b>
Industrial <b>How do you design a manufacturing plan?</b>	Industrial <b>How do you develop a training program?</b>	Industrial <b>How do you assess industrial facilities?</b>
	Industrial <b>How do you conduct studies of production systems?</b>	

E

## Handout 4

Some terminology in engineering uses compound nouns to express complex meanings. On the left is a list of prefixes and their meanings. Match these with the words on the right to create a compound noun.

		mechanical
		electricity
Bio ( <i>living</i> )		acoustics
Thermo ( <i>heat</i> )		dynamics
Electro ( <i>electricity</i> )		chemical
Aero ( <i>aircraft</i> )	+	technical
Micro ( <i>small</i> )		process
Socio ( <i>society</i> )		space
		materials
		magnetics
		electronics
		waves

## Terminology List

- ◆ organizational design
- ◆ health care systems
- ◆ advanced materials properties
- ◆ digital communication
- ◆ polymer science
- ◆ cognitive ergonomics
- ◆ aerodynamics
- ◆ process dynamics and control
- ◆ bioprocess engineering
- ◆ kinematics and dynamics
- ◆ circuit theory
- ◆ facility planning
- ◆ robotics
- ◆ thermal energy conversion
- ◆ fields and waves
- ◆ resource and product systems
- ◆ photonics
- ◆ microwaves
- ◆ pulp and paper processes
- ◆ biomechanical
- ◆ biodynamics
- ◆ biotechnical
- ◆ biochemical
- ◆ biomaterials
- ◆ biowaves
- ◆ bioprocess
- ◆ thermodynamics
- ◆ thermoelectricity
- ◆ thermomagnetism
- ◆ electromagnetics
- ◆ aerospace
- ◆ aerodynamics
- ◆ microprocess
- ◆ microspace
- ◆ microelectronics
- ◆ microwaves
- ◆ socio-technical