Course Title: ENGG406 – Engineering Safety & Risk Management - Methodologies & Tools

A) Instructor Information and Means of Contact:

Professor Chris Coles, CSP, MEng, P.Eng. Industrial Professor

Emails are welcome and please include your first and last name in emails. Emails will be answered as soon as possible – please allow two (2) or three (3) business days for my response.

Availability:

a) I will be available for brief consultations immediately after the lecture/seminar.
b) I will usually be available M/W/F from 11-noon & please schedule a meeting via email.

B) Course Information:

Term offered: 2023 Winter

Class time and locations: Lec: MWF Noon-12:50 (NRE 2-090) Sem: Wed 2:00-4:50 (ETLC E1-018)

TA Information: The Teaching Assistant (Sripradha Sankruthi) will be introduced during the first lecture.

University of Alberta calendar description: ★ 3.8 *(fi 8)* (either term or Spring/Summer, 3-3s/2-0) Introduction to process safety. Basic concepts of fires, explosions and releases. Introduction to process hazards analysis, methodologies and tools. Overview of process safety management frameworks. Case studies and industrial tour(s) demonstrate the application of specialized tools and methodologies in complex industrial operations across all engineering disciplines. Seminars develop competencies and proficiencies in applying these specialized methodologies and tools towards proactive risk management. Requires payment of additional student instructional support fees Refer to the Tuition and Fees page in the University Regulations section of the Calendar.

Prerequisites: ENGG404 or consent of instructor.

Lab Sections: None.

Seminar Section: Details provided in the Course Plan. Seminars will be used to provide practice with guest speakers, using the risk tools presented in this course.

Moodle on eClass: eClass is used extensively in this course to guide the student, to deliver on-line content, to collect term work, and to return all term-work. Your marks on the term work components will be reported through eClass. Your final grade will be reported through BearTracks.

C) Course Objectives and Philosophy:

ENGG 406 develops core competencies and proficiencies for technical risk management. The course is specifically about:

- Applying a risk based process safety management system to assess and mitigate process safety risks inherent in any operation or activity and determining appropriate risk reduction solutions.
- Learning and applying the lessons from process safety incidents.
- Applying hazard / risk identification and analysis / assessment tools and methodologies especially as related to chemical and petrochemical industries.

D) Marking Scheme – the Allocation of Course Marks and Notes:

Item	Marks
Quizzes	10%
Assignments	30%
In Class Participation	10%
Final Exam	50%
Total *(less any applicable deductions)*:	**100%**

1) **Solutions to Term-work:** Solutions for all quizzes and assignments will be posted in accordance with the Faculty Academic Policies.

2) **Final Grade:** The Final Grades for all students are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades. Letter grades are assessed according to the **University Calendar** under section **Evaluation Procedures and Grading System**, item 4): *Assigning Grades: Grades reflect judgements of student achievement made by instructors and must correspond to the associated descriptor. These judgements are based on a combination of absolute achievement and relative performance in a class.*

   The final letter grade assigned is based on the student's relative ranking in the class, and the distribution of the letter grades for a 400-level course in The Faculty of Engineering approved range.

3) **Sickness or Other Excusable Absences:** You may experience circumstances that cause you to miss completing term-work. If you miss completing a quiz or an assignment, consult with your professor to resolve for excusable reasons and determine if marks can be reallocated. Refer to the University Guideline https://www.ualberta.ca/registrar/examinations/exam-guidelines-for-instructors/what-to-do-when-a-student-is-sick Missed Final Exam is handled per University Policy.

4) **Deductions:** Deductions on the course final mark may result from penalties for late or missed term-work, as described here:
   - Marks will be deducted for late assignments at a rate of 10% of the total available mark, per day, or portion thereof (includes weekends), unless handled by extension.
   - There are no extensions on quiz due dates.
   - Deferred examinations and/or re-examinations are permitted in accordance with requirements in the University Calendar.
   - Concerns regarding marks must be brought forward within 7 calendar days of the return date.

E) Textbook and Course Materials:

The course does not have a required textbook – a couple of suggestions (not required):

Chemical Process Safety – Fundamentals with Applications; Daniel Crowl & Joseph Louvar (4th Edition)
Process Safety for Engineers: An Introduction; Center for Chemical Process Safety (2nd Edition)

Website: eClass MOODLE for the course in which you are enrolled.

Previous Examples of Evaluative Materials: The student will become competent and gain credit in this course by preparing for lecture (pre-reading materials and watching relevant videos), by attending and actively participating in the lectures and seminars, by completing the quizzes and assignments. Examples of most responses to representative evaluative materials are presented in the course lectures, course seminars, and/or on eClass.

F) University Policies:

Policy: The policy about course outlines can be found in **Course Requirements, Evaluation Procedures and Grading** of the **University Calendar**.

Academic Integrity: The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behavior and avoid any behavior which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. The Code of Student Behavior: https://www.ualberta.ca/governance/resources/policies-standards-and-codes-of-conduct/code-of-student-behaviour

Professional Conduct: As engineering students, you are also members of The Association of Professional Engineers and Geoscientists of Alberta, and are bound by the Association's Code of Ethics. Academic dishonesty also constitutes professional misconduct. Given that we are professionals, our standard is higher; thus, there is no tolerance for academic dishonesty in this course.

Recording Devices & Classroom Technology: The use of any audio or video or photographic recording device, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

G) Course-level Learning Outcomes:

The learning outcomes are stated relative to the student's completion of the course wherein the student has gained mastery of the topic as planned for and expected within the entire course content. At the end of this course, when it is expected that the student will have mastered the content of the course, the student should be able to:

1) Explain the importance and key differences of process (technical) safety management as compared to occupational safety.
2) Explain and apply the requirements of a risk based process safety management system.
3) Apply a set of engineering safety tools and methodologies to an industrial operation, to proactively address risk (hazard identification, analysis, evaluation, and assessment), with a focus on process safety management.
4) Explain the fundamental aspects of major hazards (release, dispersion, ignition sources, fires, explosions, and toxic releases) and apply these to several types of industrial operations to determine realistic process safety release outcomes.
5) Integrate and apply lessons learned from others (major case-study process safety loss incidents, presentations by risk management leaders in industry, government, and institutions) to prevent a major loss incident in your future workplace.

H) Course Content and Course Plan:

The **ENGG406 Course Plan** contains the schedule for lectures & seminars. It is posted on eClass. External presenter availability may result in changes which will be reflected in an updated **Course Plan**.

The **Summary of Course Quizzes and Assignments** contains the key dates for all quizzes and assignments. It is posted on eClass.

I) Accreditation Units

Accreditation Units: AU = 12.6 weeks x (3 + 0.5 (0 + 3/2)) = 47.25

Lectures: To determine number of lecture-hours = 12.6 x 3 = 37.8 or rounded up to 38 nominal lecture-hours in the term, or 38 lectures.

Seminars: To determine the number of seminar-hours = 12.6 x 1.5 = 18.9 or rounded up to 19 or 20 seminar-hours per term.

J) Overview of eClass, How Work is Submitted, and AR Accommodations:

eClass Overview: Make sure you have access to **eClass** using your @ualberta.ca email account as course material, schedule updates and announcements will be posted on **eClass.** Instructions and directions for using **eClass** will be given in the course. **eClass** is used extensively in this course to deliver on-line content, to collect term work, and to return all term-work. Your marks on the term work components will be reported through **eClass**.

How Work is Submitted: All assignments, quizzes, and the final exam will be submitted for academic credit through **eClass** on or before the due date as posted on the **Course Plan**. Specific instructions for submitting on-line using **eClass** will be given in the lecture. It is your responsibility to ensure your work has been properly submitted in the prescribed form. It is strongly recommended that you maintain a copy of your work.

AR Accommodations: AR manages all accommodations. The student is responsible to inform the professor of any approved accommodation in a timely manner e.g. in the first two weeks of the term, per requirements of the University Academic Policies. Failure to do so may result in your accommodation not being met.

K) Guest Lecturers:

We are fortunate to have a number of guest lecturers from industry. The contents of the lectures and seminars provide insights into how organizations practice process safety management in the workplace.

Please make every effort to attend these lectures and seminars to demonstrate your commitment as a future engineer, employee, or member of their organization and to show our appreciation for their valuable time.

L) Class Participation

ENGG406 is a senior-level undergraduate course. The course follows a blended learning approach which is a more engaging means of teaching and learning. It allows us to more efficiently use lecture and seminar time (more interaction) because the 'content' that is "sit and get" can be covered outside of class time.

You will earn marks for class participation per the following guideline:

Excellent 9/10 - A student attends lectures prepared; contributes readily to the conversation but does not dominate it; makes thoughtful contributions that advance the conversation; shows interest in and respect for others' views.

Good 7/8 – Comes to lectures prepared and makes thoughtful comments when called upon; contributes occasionally without prompting; shows interest in and respect for others' views.

Fair 4/5/6 - A student participates in discussion, but in a problematic way. Such students may talk too much, make rambling or tangential contributions, continually interrupt the instructor with digressive questions, bluff their way when unprepared, or otherwise dominate discussions, not acknowledging cues of annoyance from instructor or students.

Poor 2/3 - A student attends lectures, but does not voluntarily contribute to discussions and gives only minimal answers when called upon. Nevertheless, these students show interest in the discussion, listen attentively, and take notes.

Unsatisfactory 0/1 - Students skip lectures, they are on the margins of the class and may have a negative effect on the participation of others. Students often do not participate because they have not read the material or done the homework.