| CAPILANO UNIVERSITY<br>COURSE OUTLINE | |
|---|---|
| Term: **FALL 2018** | Course No. **APSC 140** |
| Course: **ENGINEERING DESIGN** | Credits: **3.0**<br>Section: |
| Instructor:<br>Section:<br>Office:<br>Tel:<br>email: | Instructor:<br>Section:<br>Office:<br>Tel:<br>email: |

Capilano University acknowledges with respect the Lil'wat, Musqueam, Squamish, Sechelt, and Tsleil-Waututh people on whose territories our campuses are located.

**COURSE PREREQUISITES/CO-REQUISITES:** APSC 130, and COMP 106 or COMP 120 as prerequisite with concurrency.

**COURSE FORMAT:** Three hours of class time, plus an additional hour of supplemental activity delivered through on-line, laboratory, or other field work activities for a 15-week semester, which includes two weeks for final exams.

**CALENDAR DESCRIPTION:** In this project-based course students will be introduced to the principles of engineering design and to the conventions of technical presentation. Case studies and sample problems will be used to elucidate these principles and conventions. Students will participate in the design of original solutions to new problems, and will communicate technical engineering material in graphical, written, and oral forms. Design problems will be chosen from a variety of engineering disciplines to give students some exposure to the different facets of engineering practice.

**COURSE NOTES:**

APSC 140 is an approved Science course.

APSC 140 is an approved Quantitative/Analytical course for baccalaureate degrees.

APSC 140 is an approved Science and Technology course for Cap Core requirements.

APSC 140 is an approved Capstone course for Cap Core requirements.

**REQUIRED TEXTS AND/OR RESOURCES:**

***Optional:*** Dym, Clive L. and Patrick Little. Engineering Design: A Project-Based Introduction. 4th ed. John Wiley and Sons, Inc. 2013. Available on 3-hour reserve in the Library or can be purchased through the Bookstore.

***Reference:*** Kletz, Trevor A. What Went Wrong? : Case Histories of Process Plant Disasters and How They Could Have Been Avoided. 5th ed. Butterworth-Heinemann, 2009.

Available online at:
http://ezproxy.capilanou.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=249346&site=eds-live
http://library.capilanou.ca/record=b955596

Abarca, Javier, Al Bedard, Denise Carlson, Larry Carlson, Jean Hertzberg, Bev Louie, Jana Milford, René Reitsma, Trudy Schwartz and Jackie Sullivan. Introductory Engineering Design: A Projects-Based Approach. 3rd ed. Regents of the University of Colorado, 2000.

Available online at:
http://itll.colorado.edu/courses_workshops/geen_1400/resources/textbook/)

**COURSE STUDENT LEARNING OUTCOMES:**

***On successful completion of this course, students will be able to do the following:***

- apply their creativity and their existing mathematical, scientific, drafting and technical knowledge to the solution of design problems.
- communicate technical material in written, oral, and graphical form.
- demonstrate an introductory knowledge of the engineering design process by working in project teams to solve design problems in a variety of engineering disciplines.
- produce written reports and perform oral presentations in a project group setting.
- build and evaluate the performance of a specific design.

***Students who complete this Science and Technology course will be able to do the following:***

- Apply numerical and computational strategies to solve problems.
- Evaluate scientific information. (eg. distinguish primary and secondary sources, assess credibility and validity of information)
- Demonstrate how a problem, concept or process can be modelled numerically, graphically or algorithmically.
- Participate in scientific inquiry and communicate the elements of the process, including making careful and systematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results.

***Students who complete this Capstone course will be able to do the following:***

- Identify a topic of inquiry or practice.
- Gather and organize relevant research materials.
- Evaluate, synthesize, and apply research findings.
- Share findings or results in a means appropriate to a field of study.

**COURSE CONTENT:**

The following topics will be covered in the course, not necessarily in the listed order:

| Weeks | Topic |
|---|---|
| 2 | Introduction to Engineering Design, Teamwork, Managing the Design Process, Communicating Projects |
| 4 | Client Requirements, Design Process, Problem Definition, Generating Viable Alternatives, Design Analysis and Optimization, and Evaluation of Solution, Compliance |
| 2 | Computer Aided Design, Design Tools, Failure Analysis |
| 2 | Designing for Manufacture, Affordability, Reliability and Human Factors |
| 3 | Basic Engineering Economics, Ethics in Engineering, Project Assessment, Intellectual Property |
| 2 | Exam Period |

***Lectures:*** The lectures will illustrate and discuss the engineering design process. Working in groups, students will research a given engineering design problem, prepare their design solution as a formal document, and carry out experiments to demonstrate their solution. Students will produce written reports with required engineering drawings, and perform oral presentations explaining their work.

***Computer Access:*** Drop-in access to the University computers is available during the hours posted outside each lab, subject to computer availability. Please respect the directions of the instructor in the lab if asked to leave the lab due to a class booking.

**EVALUATION PROFILE:**

Final grades for the course will be computed based on the following schedule:

| | |
|---|---|
| Oral Presentations | 10% |
| Class Participation | 5% |
| Midterm Exam | 20% |
| Final Project | 30% |
| Final Exam | 30% |
| Performance Evaluation | 5% |
| TOTAL | 100% |

***Performance evaluation*:**
In the absence of exceptional circumstances, which are determined at the instructor's discretion, the performance evaluation component of the final grade will be prorated to the rest of the grade. The most common circumstance justifying an increased performance evaluation mark is a marked improvement in performance in the final examination relative to the tests during the term, where the instructor feels justified in

giving an elevated grade.

**GRADING PROFILE:** Letter grades will be assigned according to the following guidelines:

| | | | |
|---|---|---|---|
| A+ 90 - 100% | B+ 77 - 79% | C+ 67 - 69% | D 50 - 59% |
| A 85 - 89% | B 73 - 76% | C 63 - 66% | F 0 - 49% |
| A- 80 - 84% | B- 70 - 72% | C- 60 - 62% | |

Students should refer to the University Calendar for the effect of the above grades on grade point average.

***Incomplete Grades:*** Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

***Late Assignments:*** Assignments are due at the beginning of class, unless otherwise announced. Late assignments may receive a grade of zero.

***Missed Exams/Quizzes/Labs etc.***:
Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets all of the following conditions:

1. Circumstances are beyond the control of the student which resulted in the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.

2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances must be provided. Proof of illness or injury may require a note from a doctor, who may also be consulted.

4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all classes and turning in almost all assignments in the course.

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

***Attendance:*** Attendance at lectures, labs and tutorials is expected. You are responsible for all information given in the lectures, labs and tutorials, including the times of tests and deadlines for assignments.

***English Usage:*** Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile. Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University Bookstore).

***Electronic Devices:*** Students may use electronic devices during class for note-taking and math calculation only.

***On-line Communication:***
Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or Moodle; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

## UNIVERSITY OPERATIONAL DETAILS

**Tools for Success**
Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at:
http://www.capilanou.ca/services/

**Capilano University Security: download the CapU Mobile Safety App**

**Policy Statement (S2009-06)**
Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other educational issues. These and other policies are available on the University website.

**Academic Integrity (S2017-05)**
Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy S2017-05 for more information:
http://www.capilanou.ca/about/governance/policies/Policies/

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

**Academic dishonesty** is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

**Cheating**: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;

- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

**Fraud**: Creation or use of falsified documents.

**Misuse or misrepresentation of sources**: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

**Plagiarism**: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

**Self-Plagiarism**: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted without permission of the instructors.

**Prohibited Conduct**: The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

**Sexual Violence and Misconduct**

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

> Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure.

**Emergencies:** Students are expected to familiarize themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.