Faculty of Engineering

Department of Mechanical Engineering

COURSE OUTLINE

ENGR 141 – Engineering Mechanics

Term – Summer 2018 (201805)

INSTRUCTORS

Instructor	Office Hours
Dr. Mohsen Akbari	Days: TBD
Phone: 250-721-6038	Time: TBD
E-mail: makbari@uvic.ca	Location: EOW 553

List all prerequisites and co-requisites: None

LECTURE SCHEDULE

Section: A01	CRN: 30379	Days: M,Th	Time: 10:00am-11:20am	Location: ECS 116

TUTORIAL SCHEDULE

Section: T01	CRN: 30380	Days: T	Time: 11:30 am - 12:20 pm	Location: ECS 108
Section: T02	CRN: 30381	Days: T	Time: 14:30 am - 15:20 pm	Location: ECS 104

ATTENDANCE

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time.

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TEACHING ASSISTANTS

A team of 2 teaching assistants (TAs) will manage the tutorial sessions, help deliver the ENGR 141 seminars and assist in grading the handwritten assignment problems.

TA Name	E-mail
Majid Soleimani nia	majids@uvic.ca
Wei Henglai	henglaiwei@uvic.ca

TEXTBOOKS & ONLINE COURSE MATERIALS (MASTERING ENGINEERING)

Required Text	Optional Text
Title: *Engineering Mechanics – Statics & Dynamics*	Any previous version of Hibbeler's textbook going back to a 6th edition will contain the material covered in lecture period. However, ***the section numbers/headings referred to in the "SYLLABUS" section of this course outline and all assignment problems are specific to the 14th edition***.
Author: RC Hibbeler	
Publisher/Year: Pearson Canada / ©2016	
Reference Materials: Pages XIV-XV of the course textbook describe extra learning activities available through the Pearson "Statics Study Pack", video problem solutions and a solved problem workbook. The statics study	

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pack is bundled with the course textbook for purchase at the UVic bookstore. The video solutions and solved problem workbook are available through the course Mastering Engineering website (see above).

COURSE OBJECTIVES

ENGINEERING 141 – ENGINEERING FUNDAMENTALS I: is an introduction to ***mechanics***. This course deals with the concept of equilibrium as applied to rigid bodies- the case in which the forces and moments acting on a body do not result in an acceleration of the body. The course will define a methodology, the method of statics, used to determine certain forces and moments acting on and within rigid bodies, and structures and machines composed of rigid components, that are in equilibrium. The most important concept that will be introduced is the free-body diagram. The objective of this course is to instill the abilities to create and interpret free body diagrams and solve complicated mechanics problems ***in a clear and concise manner.***

Main Entry: **en·gi·neer**
Pronunciation: "en-ju-'nir
Etymology: alter. of earlier *enginer*, from Middle English, alteration of *enginour*, from Middle French *engigneur*, from Old French *engignier* to contrive, from *engin*

1: a member of a military group devoted to engineering work. **2** (obsolete) : a crafty schemer : plotter. **3** ***(a)*** : a designer or builder of engines ***(b)*** : a person who is trained in or follows as a profession a branch of engineering (***c) : a person who carries through an enterprise by skillful or artful contrivance.*** **4**: a person who runs or supervises an engine or an apparatus.

To ensure students are fluent in the method of statics, both physical systems of units, International System (SI) and US Customary (FPS), are considered throughout the course problem sets. To define and communicate three-dimensional vector quantities, Cartesian notation is applied throughout the course.

The lectures will closely adhere to Hibbeler's textbook sections. We begin with the study of vector algebra and rigid body equilibrium and then carry these principles forward to the basic study of structures - assemblies of rigid bodies. The second half of the course starts by looking at ways of determining the internal loads in a structure or simple machine. In particular, a concise method of obtaining the internal shear and bending moment diagrams for beams is discussed thoroughly. Rounding out this course are studies of equilibrium problems involving friction and methods for locating centroids of lines, area and volumes.

LEARNING OUTCOMES: At the end of this course, students will be able to:

1	Sketch three-dimensional Cartesian reference frames, force vectors and moment vectors.
2	Assign reference points and calculate the moment of a force relative to those points.
3	Combine several forces and moments to form simpler equivalent force-couple systems.
4	Identify the forces and moments acting on a rigid body and draw the corresponding free body diagram (**FBD**).
5	Apply the method of statics to FBDs to solve for reaction forces and moments, including:
	a Divide a structure into sub-assemblies that can be analyzed using equations of static equilibrium.
	b Manipulate algebraic equations of equilibrium to solve for unknown forces and moments.
	c Judge whether the static equilibrium assumption is possible based on solutions to equilibrium equations.
6	Calculate internal forces and moments in truss and beam structures.
7	Recognize statically determinant and indeterminant mechanics problems by observation of FBDs.
8	Interpret parametric solutions to equilibrium equations to measure the ability of a structure or a machine to sustain loads.
9	Organize multiple FBDs in the solution of impeding motion problems.
10	Locate the centroids of lines, areas and volumes using single variable calculus and first moments of area.

CONTENT OVERVIEW

The lectures will attempt to cover the textbook sections as follows:

BOOK SECTION#	TOPICS COVERED	WEEK #	TEST DATE	QUIZZES/ASSIGNMENTS
1.1 – 1.6	Introduction: Course Overview, SI units, analysis procedure	**05.07-05.11**		
2.1 - 2.9	Vectors: forces and positions, vector algebra, inner (dot) product	**05.14-05.18**		**Assignment 1**
3.1 – 3.4	Particle Equilibrium, Equilibrium equations	**05.21-05.25**	Test 1: Thursday, May 24	**Assignment 2**
4.1 – 4.3	Force system resultants: moment of a force	**05.28-06.01**		**Assignment 3**
4.3-4.8	cross product, principle of moments, reduction to equivalent loads	**06.04-06.08**		**Assignment 4**
5.1 – 5.7	Equilibrium of rigid bodies: Equilibrium equations, FREE-BODY DIAGRAMS, Interconnections (constraints)	**06.11-06.15**	Test 2: Thursday, June 11th	**Assignment 5**
6.1 – 6.4	Truss analysis: methods of joints and sections	**06.18-06.22**		**Assignment 6/Quiz**

6.6	Frames and Machines.	**06.25-06.29**	Test 3:Thursday June 28th	**Assignment 7**
4.9	Internal forces: distributed loads, shear and bending moment diagrams, method of sections.	**07.02-07.06**		**Monday 2nd, reading break**
7.1 – 7.2	Internal forces: distributed loads, shear and bending moment diagrams, method of sections.	**07.09-07.13**		**Assignment 8/ Quiz**
7.3	Shear and bending moment diagrams: differential relations.	**07.16-07.20**	:	**Assignment 9**
8.1, 8.2, 8.3,8.4	Friction: dry friction s crew forces, wedges	**07.23-07.27**		**Assignment 10/ Quiz**
9.1 – 9.2	Centroids: center of gravity, composite bodies, integral methods.	**07.30-08.03**	Test 4: Thursday August 3rd	

TUTORIALS

The weekly ENGR 141 tutorials are not mandatory but highly recommended. In the tutorial periods, students will complete assigned tutorial problems with the help of their TAs.

INSTRUCTOR OFFICE HOURS

Students are encouraged to contact the instructors and TAs to arrange for help with course material.

ASSIGNMENTS

Homework assignments will be assigned on a weekly basis. The assignments will be collected and evaluated as a bonus. Individual in-class quizzes based on the problems that are conceptually similar to the homework assignments. The quizzes will be conducted in a written format with open books and notes. Computers and wireless devices will not be permitted.

Assignment #	Modules	Start	Due (in class)
1	Introduction: Course Overview, SI units, analysis procedure	May 14th	May 21th
2	Vectors: forces and positions, vector algebra, inner (dot) product	May 21th	May 28th
3	Particle Equilibrium, Equilibrium equations	May 28th	June 4th
4	Force system resultants: moment of a force	June 4th	June 6th
5	cross product, principle of moments, reduction to equivalent loads	June 11th	June 11th
6	Equilibrium of rigid bodies: Equilibrium equations, FREE-BODY DIAGRAMS, Interconnections (constraints)	June 18th	June 20th
7	Truss analysis: methods of joints and sections	June 25th	July 9th

8	Frames and Machines.	July 9th	July 16th
9	Internal forces: distributed loads, shear and bending moment diagrams, method of sections.	July 16th	July 23th
10	Internal forces: distributed loads, shear and bending moment diagrams, method of sections.	July 23th	July 28th

- There will be 10 assignment problems which will be given to you on Mondays (starting May 14th) each week. The students will have one week to solve the problems.
- Assignments are worth 20% of the final grade.
- Students MUST return their assignments on the following Monday by the end of the lecture. For example, Assignment#2 will be posted online on May 21st, thus, the students MUST submit it by the end of the lecture on May 28rd to me in the class. No late submissions will be accepted.
- Two random problems will be selected, graded, and feedback will be provided to you. The solutions to the assignments will be uploaded as well for their review. Each assignment will be graded out of 100% (50% for submitting the assignment and 50% for correct solutions)

GRADING SCHEME

Assessment:	**Weight**	**Date**
Assignments	20%	See "ASSIGNMENTS" section above
Tutorials attendance[1]	5%	Weekly, starting May 9th
Pop quizzes (3)[2]	3×5%=15%	-
Test 1	15%	May 19th
Test 2	15%	June 2nd
Test 3	15%	June 27th
Test 4	15%	July 28th
Total	**100%**	

1. Attendance will be taken during the tutorials by the TAs.

2. Pop quizzes will be taken during the Tutorial sessions.

3. The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

CALCULATORS

Self-contained (with no wireless communication capability) calculators are allowed in all tests. Students should note, however, that the grading of assignment, test, and project problems in ENGR 141 will be based heavily on the methodology applied in calculating the final solution. ***A significant proportion of assignment, quizzes and tests marks are awarded based on a clear and logical presentation of the solution process including diagrams.***

Faculty of Engineering
Department of Mechanical Engineering
COURSE OUTLINE

GENERAL INFORMATION

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

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Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.
The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Centre for Accessible Learning (CAL)
https://www.uvic.ca/services/cal/

Accommodation of Religious Observance (AC1210)
https://web.uvic.ca/calendar2018-01/general/policies.html

Discrimination and Harassment Policy (GV0205)
https://web.uvic.ca/calendar2018-01/general/policies.html

Faculty of Engineering, University of Victoria
Standards for Professional Behaviour

"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals…."

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.
http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Academic Integrity

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity:

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http://web.uvic.ca/calendar2018-01/undergrad/info/regulations/academic-integrity.html#