

## ENGR 175 – ENGINEERING MECHANICS: STATICS

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INSTRUCTOR: DR. KATHERINA TARNAI-LOKHORST, P.ENG, FEC

OFFICE: TEC 115

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### COURSE DESCRIPTION

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Introduction to engineering mechanics. Dealing with equivalent force systems, conditions for equilibrium: statics of rigid bodies, frames and machines; extension of the application of free body diagrams to complex structures; reactions at supports; two-dimensional force analysis of trusses using methods of joints and sections; three dimensional vector analysis of forces and moments. Focus on interpreting and solving engineering mechanics problems in clear and concise manner.

### TEXTBOOK & REFERENCES

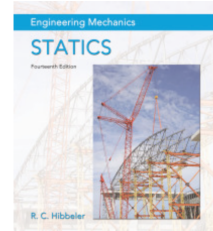
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#### REQUIRED ITEMS:

**Engineering Mechanics - Statics**, 14<sup>th</sup> Ed., R.C. Hibbeler, ISBN 9780133918922, 0133918920  
Available at <https://www.vitalsource.com/referral?term=9780133921656>

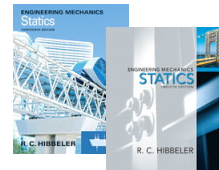
**Course Notes** available in D2L at <http://online.camosun.ca>

**Geometry tools**, to include large triangles (45-45-90 and 30-60-90) and protractor



#### OPTIONAL ITEMS & REFERENCES:

**Engineering Mechanics - Statics**, 13<sup>th</sup> Ed., R.C. Hibbeler, or earlier (however, assignment numbers will likely not match)



**Vector Mechanics for Engineers: Statics**, 10<sup>th</sup> Ed., Beer, Ferdinand; Johnston, Jr., E. Russell; Mazurek, David, McGraw-Hill, ISBN 9780077402280



### INTENDED LEARNING OUTCOMES

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Upon completion of this course, students will be able to:

1. Analyze the forces acting both externally and internally on static objects and structures;
2. Utilize algebraic and graphical methods in analyzing static situations;
3. Present static analyses in a complete and clear manner including:
  - a. Sketching two- and three-dimensional references frames and vectors,
  - b. Labeling of sketches and diagrams, and
  - c. Using engineering vector notation;
4. Identify the forces and moments acting on a rigid body and draw the corresponding free body diagram.
5. Assign reference points and calculate moments of forces relative to these points;
6. Explain the various structural forms including rods, connections, beams, circular shafts and some types of simple trusses, frames and machines;
7. Divide a structure into sub-assemblies for static analysis;
8. Use the concepts of the principles of statics, free body diagrams and component methods

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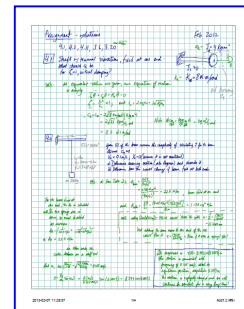
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## COURSE AGENDA (SUBJECT TO MODIFICATION) – UPDATE 2019

Module	Activities	Reading (prior to lectures)	Course Topics (subject to modification)
1	Vector Review and Graphical Methods <b>Team Project Charter</b> - name, project ideas, expectations for behaviour (study block)	Chapters 1 & 2	Equilibrium of a Particle: scalars, Cartesian vectors, direction cosines, unit vectors, and force vectors in 2- and 3-D – focus on resultants Static Equilibrium & Equilibrium of a Rigid Body: moment of a force, resultant moment of a system of forces
2	<b>Lab 1</b> Static Systems – Equilibrium of a Particle and of a Body; Free Body Diagrams for Engineering	Chapters 3 & 4	Distributed force/pressure systems, couples, moments about arbitrary axes, combined force/moment systems, free-body diagrams.  Analysis may include applications of dot and cross products, matrices and graphical methods in 2- and 3-D.
3	<b>Midterm 1</b> (2 <sup>nd</sup> lecture class) Project presentation		
4	<b>Lab 2:</b> Static Systems – Equilibrium of Systems	Chapters 5 & 6	Frames & Machines: structural analysis, trusses, two-force members, method of joints, method of sections.
5	<b>Lab 3:</b> Static Systems – other applications		<del>Internal forces, shear &amp; bending moment diagrams.</del> Friction of bodies, ropes and belts.
6	<b>Midterm 2</b> (2 <sup>nd</sup> lecture class)	Chapter 7 & 8	Discussion of centroids of lines, areas, and volumes; centroids of composite bodies, second-moment of area, geometric properties of sections, center of gravity
7	Internal forces <b>Project Presentations</b>		

## ASSIGNMENTS & REPORTS

Lab sessions will consist of simple experiments and project work periods. Assignments and reports include grading and feedback with complete solutions posted. Late reports or assignments accepted for completion grades only. All assignments and reports must be handed to instructor prior to the final class in order to write final examination of knowledge.



Assignments must be neatly completed on engineering paper or equivalent. Illegible assignments will be returned unmarked (qualify for completion grade only). Reports must be completed as per the guidelines posted in D2L, using the available template.

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### EVALUATION & GRADING SYSTEM (CAMOSUN STANDARD)

Midterm Tests	30%	A+	90-100	B-	70-72
Assignments	15%	A	85-89	C+	65-69
Project/Lab Reports	15%	A-	80-84	C	60-64
Final Test	40%	B+	77-80	D	50-59
<i>(final test grade of minimum 50% required to successfully complete the course requirements)</i>		B	73-76	F	<50

### COLLEGE SUPPORTS, SERVICES AND POLICIES



#### IMMEDIATE, URGENT, OR EMERGENCY SUPPORT

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

#### COLLEGE SERVICES

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

#### COLLEGE POLICIES

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

#### TEMPORARY GRADES

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://www.camosun.bc.ca/policies/E-1.5.pdf> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.