University of Ontario Institute of Technology
Faculty of Engineering and Applied Science
Department of Automotive, Mechanical and Manufacturing Engineering

Course Outline
MECE 2230U
Statics
Fall 2017

Course Description:

This course provides fundamental engineering knowledge of static systems, bodies at rest, force and moment equilibrium of rigid bodies, and mechanics of materials and deformable bodies. Course topics include: forces; moments of forces; couples; resultant and equilibrium of force systems; distributed loads; equilibrium of particles and rigid bodies; analysis of structures including beams, structural analyses including trusses, frames and machines; mechanical joints, the concept of internal forces, shear and moment forces and diagrams, relations between distributed load, shear and moments; friction forces on mechanical components, centroid, moment of inertia, parallel axis theory, Mohr's circle for moment of inertia, concept of virtual work.

Major Topics:

- General Principles
- Force Vectors
- Equilibrium of a Particle
- Force System Resultants
- Equilibrium of a Rigid Body
- Structural Analysis
- Internal Forces
- Friction
- Centre of Gravity and Centroid
- Moments of Inertia
- Virtual Work

Graduate Attributes:

The graduate attributes developed and required by the Canadian Engineering Accreditation Board's Acc Procedures are listed below, with those covered in the course to some degree (introduced, developed, applied). More details about the accreditation of engineering programs and graduate attributes can be found here: http://www.engineering.uoit.ca/undergraduate/ceab-accredited-programs-and-admissions

Attributes	Covered in this Course
Knowledge base	✓
Problem analysis	✓
Investigation	✕
Design	✕
Use of engineering tools	✕
Individual and team work	✕
Communication skills	✕
Professionalism	✕
Impact of engineering on society and the environment	✕
Ethics and equity	✕
Economics and project management	✕
Life-long learning	✕

Course Content Breakdown

Math	Basic Science	Complementary Studies	Engineering Science	Engineering Design
0%	25%	0%	75%	0%

Course Outcomes:

This course provides students fundamental knowledge of static systems, bodies at rest, force and moment, equilibrium of rigid bodies, and mechanics of materials and deformable bodies. The course topics include: forces; moments of forces; couples; resultant and equilibrium of force systems; distributed loads; equilibrium of particles and rigid bodies; analysis of structures including beams, structural analyses including trusses, frames and machines; mechanical joints, shear and moment forces and diagrams, shear and moments; internal forces; friction forces on mechanical components, centroid, moment of inertia, parallel axis theory, concept of virtual work.

At the end of this course, the student will be able to:

- demonstrate a good understanding of the principles and concepts in all the topics detailed in the course outlined below;
- use appropriate charts, free-body diagrams, and equations to solve statics problems;
- apply appropriate mechanics concepts, principles and equations to analyze statics problems; and
- employ appropriate simplifying assumptions and basic statics principles and concepts to obtain mathematical models of physical static systems.

Instructors

Instructor: **Email:** **Office:** **Phone:** **Office Hours:**

Dr. Carlos Rossa	carlos.rossa@uoit.ca	ERC 3063	x 5477	Tuesdays from 11:00 to 13:00; Fridays fr

Instructor:	Email:	Office:	Phone:	Office Hours:
Dr. Jaho Seo	jaho.seo@uoit.ca	ERC 3064	x 5516	Tuesdays 10:30 to 12:30; Thursdays 10:30 to 12:30

Instructor:	Email:	Office:	Phone:	Office Hours:
Dr. Anand Joshi	anand.johi@uoit.ca	ERC2029	TBD	Mondays 10:00 to 12:00 pm; Wednesday: 12:00 am to 2:00 pm.

Teaching Assistants

TA Name:	Email:	Office:	Extension:	Office Hours:
Karim Sachedina	karim.sachedina@uoit.ca	ACE 4030B	5 772	Fridays 1 pm - 3 pm

TA Name:	Email:	Office:	Extension:	Office Hours:
Zeinab El-sayegh	zeinab.el-sayegh@uoit.ca	ACE 4030B		Fridays 1 pm - 3pm

TA Name:	Email:	Office:	Extension:	Office Hours:
Mohamed Aboughaly	mohamed.aboughaly@uoit.ca	ERC 4094		Mondays 9 am to 12 am

Required Course Text and Other Materials:

- Engineering Mechanics: Statics 14E by R. C. Hibbeler, Pearson Prentice Hall, 2016

Reference Books and Information Sources:

- Study Pack for Engineering Mechanics: Statics 14E by R. C. Hibbeler, Pearson Prentice Hall, 2016

Course Organization and Delivery Mode:

This course has three classroom lecture hours per week, one tutorial hour per week and five office hours per week.

Section	CRN	Day	Time	Venue	Instructor
		Lectures			
001	43409	Wednesdays	9:40 am - 11:00 am	SIRC 2020	Dr. A. Joshi
001	43409	Fridays	9:40 am - 11:00 am	SIRC 2020	Dr. A. Joshi
007	43744	Tuesdays	8:10 – 9:30 AM	SIRC 2060	Dr. J. Seo
007	43744	Thursdays	8:10 – 9:30 AM	SIRC 2060	Dr. J. Seo
008	43807	Wednesdays	9:40 am - 11:00 am	Simcoe Building/J-Wing J102	Dr. C. Rossa
008	43807	Fridays	9:40 am - 11:00 am	Simcoe Building/J-Wing J102	Dr. C. Rossa
		Tutorials			
002	43410	Wednesdays	4:10 pm - 5:00 pm	Science Building (UA) UA3120	Mohamed Aboughaly
003	43411	Wednesdays	12:10 pm - 1:00 pm	Science Building (UA) UA3120	Zeinab El-Sayegh
004	43412	Fridays	8:10 am - 9:00 am	Science Building (UA) UA3140	Karim Sachedina
005	43413	Fridays	8:10 am - 9:00 am	Science Building (UA)	Zeinab El-Sayegh

				UA1240	
006	43414	Thursdays	8:10 am - 9:00 am	Science Building (UA) UA2140	Karim Sachedina

Lectures and tutorials are mandatory.

Scheduled Regular Class Meeting Times:

See course organization above

Final Grade Breakdown:

Evaluation	Weight (%)
Assignments	10
Midterm 1	15
Midterm 2	25
Final exam	50
Total	**100**

Midterms

Midterm Date:	Midterm Location:
Friday, September 29, 2017 - 09:40 to 11:00	Section 1 - SIRC 2020
Midterm Date:	**Midterm Location:**
Friday, September 29, 2017 - 09:40 to 11:00	Section 8 -Simcoe Bd/J102
Midterm Date:	**Midterm Location:**

Thursday, September 28, 2017 - 08:10 to 09:10	Section 7 - SIRC 2060

Midterm Date:	**Midterm Location:**
Saturday, November 4, 2017 - 15:45 to 18:00	Section 1 - UB2080

Midterm Date:	**Midterm Location:**
Saturday, November 4, 2017 - 15:45 to 18:00	Section 7 - UA1140

Midterm Date:	**Midterm Location:**
Saturday, November 4, 2017 - 15:45 to 18:00	Section 8 - UA1350

Assignments:

Assignments are posted on the course webpage on Blackboard with deadlines. There will be up to 8 assignments in total.

Late assignments are not accepted, except with a medical statement.

Solutions to assignments will be posted after the deadline.

Tutorials:

There are twelve (12) tutorial sessions. Each student is advised to choose the time slot most suitable to them.

There is one hour weekly tutorials during which the Teaching Assistants will choose problems from the textbook and solve as a practice demonstration for students.

In addition, TAs will assist students in general course problems and aspects of the assignments.

Tutorials are mandatory.

Summary of Important Dates and Marking Scheme:

There will be 2 midterms and 1 final exam.

Midterm 1 - Will cover the contents of lectures 1 to 6 (during regular lecture hours and location)

- Midterm 1 will be during regular lecture hours
- Section 7 - Thurs Sep 28 - 8:10 am to 9:30 am, SIRC 2060
- Section 8 - Friday Sep 29 - 9:40 am to 11:00 am, Simcoe Building/J-Wing J102
- Section 1 - Friday Sep 29 - 9:40 am to 11:00 am, SIRC 2020

Midterm 2 - Will cover the contents of lectures 1 to 14 (Saturday, November 4, 15:45 - 18:00)

- Saturday, November 4, 15:45 - 18:00
- Section 7 - UA1140

- Section 8 - UA1350
- Section 1 - UB2080

Final exam - Will cover the contents of lectures 1 to 23

- All Sections - Exam period in December - Location, date, and time TBD

Students are allowed to prepare their own formula sheet: Maximum 1 letter-sized paper, both sides.

Formula sheets must be handed in with each exam.

Other Course Information:

Students required to

- Attend **all lectures** and tutorials on time.
- Study all the materials given in lectures and tutorials thoroughly and continuously. Annotated lecture notes will be posted on Blackboard after each class.
- Visit Blackboard often to be informed of course calendar, lecture notes, announcements and solutions to problems, and tests.
- Finish the assignments on time and hand them on the due date.

Academic Integrity and Conduct

- Cheating, plagiarism that is caught, both Giver and Taker will be heavily penalized.
- UOIT is committed to the fundamental values of preserving academic integrity as defined in UOIT policies and contained in the UOIT Calendar. Students are strongly advised to familiarize themselves with UOIT's policies and statements in this area.
- Acts of academic dishonesty, including plagiarism, cheating, aiding others in cheating, examination impersonation or any other form of academic misconduct will be dealt with severely as these threaten the integrity of the academic system and are not acceptable.

Accessibility

To ensure that disability-related concerns are properly addressed during this course, students with documented disabilities and who may require assistance to participate in this class are encouraged to speak with their instructors as soon as possible. Students who suspect they may have a disability that may affect their participation in this course are advised to go to the Centre for Students with Disabilities (Room SW116, Gordon Willey Building) as soon as possible.

Medical Certificates and Deferred Exams:

Medical certificates **MUST** be sent **DIRECTLY** from the Doctor's Office or Hospital within five (5) days by mail the Academic Advisor of FEAS (Fax: 905.721.3370, Attn: Academic Advising Team).

Should the medical certificate proven to be invalid due to any kind of action by the student, such student's behaviour will be considered as a major misconduct and respective disciplinary actions will be commenced.

Failure to comply with the above will result in an mark of 0 for the exam.

Accessibility:

Students with disabilities may request to be considered for formal academic accommodation in accordance with the Ontario Human Rights Code. Students seeking accommodation must make their requests through the Centre for Students with Disabilities in a timely manner, and provide relevant and recent documentation to verify the effect of their disability and to allow the University to determine appropriate accommodations.

Accommodation decisions will be made in accordance with the Ontario Human Rights Code. Accommodations will be consistent with and supportive of the essential requirements of courses and programs, and provided in a way that respects the dignity of students with disabilities and encourages integration and equality of opportunity. Reasonable academic accommodation may require instructors to exercise creativity and flexibility in responding to the needs of students with disabilities while maintaining academic integrity.

Academic Integrity and Conduct:

Students and faculty at UOIT share an important responsibility to maintain the integrity of the teaching and learning relationship. This relationship is characterized by honesty, fairness and mutual respect for the aim and principles of the pursuit of education. Academic misconduct impedes the activities of the university community and is punishable by appropriate disciplinary action.

Students are expected to be familiar with UOIT's regulations on Academic Conduct (Section 5.15 of the Academic Calendar) which sets out the kinds of actions that constitute academic misconduct, including plagiarism, copying or allowing one's own work to copied, use of unauthorized aids in examinations and tests, submitting work prepared in collaboration with another student when such collaboration has not been authorized, and other academic offences. The regulations also describe the procedures for dealing with allegations, and the sanctions for any finding of academic misconduct, which can range from a written reprimand to permanent expulsion from the university. A lack of familiarity with UOIT's regulations on academic conduct does not constitute a defense against its application.

Further information about academic misconduct can be found in the Academic Integrity link on your laptop.

Turnitin:

UOIT and faculty members reserve the right to use electronic means to detect and help prevent plagiarism. Students agree that by taking this course all assignments are subject to submission for textual similarity review by Turnitin.com. Assignments submitted to Turnitin.com will be included as source documents in Turnitin.com's restricted access database solely for the purpose of detecting plagiarism in such documents for five academic years. The instructor may require students to submit their assignments electronically to Turnitin.com or the instructor may submit questionable text on behalf of a student. The terms that apply to UOIT's use of the Turnitin.com service are described on the Turnitin.com website.

Students who do not wish to have their work submitted to Turnitin.com must provide with their assig submission to the instructor a signed Turnitin.com Assignment Cover sheet:

http://www.uoit.ca/assets/Academic~Integrity~Site/Forms/Assignment%20Cover%20sheet.pdf

Further information about Turnitin can be found on the Academic Integrity link on your laptop.

Student Sexual Violence Policy

UOIT is committed to the prevention of sexual violence in all is forms. For any UOIT student who has experienced Sexual Violence, UOIT can help. UOIT will make accommodations to cater to the diverse backgrounds, cultures, and identities of students when dealing with individual cases.If you think you have been subjected to or witnessed sexual violence:

- Reach out to a Support Worker, who are specially trained individuals authorized to receive confidential disclosures about incidents of sexual violence. Support Workers can offer help and resolutions options which can include safety plans, accommodations, mental health support, and more. To make an appointment with a Support Worker, call 905.721.3392 or email supportworker@uoit.ca
- Learn more about your options at: www.uoit.ca/sexualviolence

Freedom of Information and Protection of Information Act:

The following is an important notice regarding the process for submitting course assignments, quizzes and other evaluative material in your courses.

As you may know, UOIT is governed by the Freedom of Information and Protection of Information Act (“FIPPA”). In addition to providing a mechanism for requesting records held by the university, this legislation also requires that UOIT not disclose the personal information of its students without their consent.

FIPPA’s definition of “personal information” includes, among other things, documents that contain both your name and your Banner ID. For example, this could include graded test papers or assignments. To ensure that your rights to privacy are protected, UOIT encourages you to use only your Banner ID on assignments or test papers being submitted for grading. This policy is intended to prevent the inadvertent disclosure of your information where graded papers are returned to groups of students at the same time. If you still wish to write both your name and your Banner ID on your tests and assignments, please be advised that UOIT will interpret this as an implied consent to the disclosure of your personal information in the normal course of returning graded materials to students.

If you have any questions or concerns relating to the new policy or the issue of implied consent addressed above, please contact the UOIT privacy office.

Detailed Course Content:

The lectures will cover the following Chapters and Sections in the course textbook.

1. **General Principles**: Mechanics; Fundamental Concepts; Units of Measurement; The International Syste
Calculations; and General Procedure for Analysis.

2. **Force Vectors**: Scalars and Vectors; Vector Operations; Vector Addition of Forces; Addition of a System of Coplanar Forces; Cartesian Vectors; Position Vectors; Force Vector Directed Along a Line; and Dot Product.

3. **Equilibrium of a Particle**: Condition for the Equilibrium of a Particle; Free-Body Diagram; Coplanar Force Systems; and Three-Dimensional Force Systems.

4. **Force System Resultants**: Moment of a Force – Scalar Formulation; Cross Product; Moment of a Force – Vector Formulation; Principle of Moments; Moment of a Force about a Specified Axis; Moment of a Couple; Simplification of a Force and Couple System; and Reduction of a Simple Disturbed Loading.

5. **Equilibrium of a Rigid Body**: Conditions for Rigid-Body Equilibrium; Free-Body Diagrams; Equations of Equilibrium; Two- and Three-Force Members; Free-Body Diagrams; Equations of Equilibrium; and Constraints and Statical Determinacy.

6. **Structural Analysis**: Simple Trusses; The Method of Joints; Zero-Force Members; The Method of Sections; and Frames and Machines.

7. **Internal Forces**: Internal Loadings Developed in Structural Members.

8. **Friction**: Characteristics of Dry Friction; Problems Involving Dry Friction; Wedges; Frictional Forces; on Screws; Frictional Forces on Flat Belts; and Frictional Forces on Journal Bearings.

9. **Centre of Gravity and Centroid**: Centre of Gravity, Centre of Mass, and the Centroid of a Body; and Composite Bodies.

10. Moments of Inertia: Definition of Moments of Inertia for Areas; Parallel-Axis Theorem for an Area; Radius of Gyration of an Area; Moments of Inertia for Composite Areas; and Mass Moment of Inertia.

11. Virtual Work: Definition of Work; Principle of Virtual Work; and Principle of Virtual Work for a System of Connected Rigid Bodies.