

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Fall 2022

EG1300 (A2): ENGINEERING MECHANICS – 4.0 (3-0-2) 75 Hours for 15 Weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR: Braden Kelly **PHONE:** (780) 539-2963
OFFICE: J218 **E-MAIL:** bkelly@nwpolytech.ca
OFFICE HOURS: Unrestricted drop-in/by-appointment

CALENDAR DESCRIPTION:

The course covers the equilibrium of planar systems. Analysis of statically determinate trusses and frames, friction, centroids and centers of gravity, forces and moments in beams, second moments of area are included. **Restricted to Engineering students.**

COREQUISITE:

MA1000

REQUIRED TEXT/RESOURCE MATERIALS:

Engineering Mechanics, Statics, University of Alberta's open educational resources. Free open-access via <https://engcourses-uofa.ca/books/statics/>

RECOMENDED TEXT/RESOURCE MATERIALS:

Hibbeler, R. C. - *Engineering Mechanics: Statics*. SI units, 14th Edition. Prentice Hall/Pearson.
Meriam, J. L. - *Engineering Mechanics: Statics*. SI Version, Wiley.
Sheppard, S. D. - *Engineering Mechanics: Statics*. Wiley.

DELIVERY MODE(S):

Lecture and labs

COURSE OBJECTIVES:

The instructor will provide an understanding of Cartesian 2-D vector representation tools for the calculation of forces and moments and will demonstrate the use of Free Body Diagrams as the main method of analysis for 2-D trusses and frames. Also, methods to evaluate the internal forces and moments of trusses and frames will be presented. Simply distributed loads will also be shown to be valid loading conditions using their centroids for calculating simply loaded structures in equilibrium.

LEARNING OUTCOMES:

Students will have the knowledge to be able to analyze and calculate the forces and moments acting on members of 2-D and 3-D planar structures in equilibrium such as trusses and frames. They will be able to include various 1-D and 2-D distributed loading configurations using centroids and centers of gravity. (the following list is taken from Professor Leila Hashemian's course outline at UofA for ENGG 130:

1. Conduct basic vector operations for solving engineering mechanics problems such as dot product and cross product using force and position vectors etc.
2. Draw free body diagrams for 2D and 3D particles and rigid bodies
3. Write & solve force equilibrium equations for particles in 2D and 3D
4. Calculate the moment of forces in 2D and 3D for solving engineering mechanics problems
5. Write and solve the force and moment equilibrium equations for rigid bodies in 2D and 3D.
6. Analyze simple structures such as trusses, frames and machines for calculating the internal forces and internal moments.
7. Employ the concept of static equilibrium for evaluation of the friction problems
8. Calculate centroids, centre of mass, and moments of inertia for application in EG1300 and in subsequent courses.

TRANSFERABILITY:

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page <http://www.transferalberta.ca>.

**** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

EVALUATIONS:

Component	Weight	Comment
Assignments	12%	Weekly, submitted online.
Lab assignments	18%	Assigned problems solved and handed in at end of each lab.
Midterm Exam	30%	October 20 th or 22 nd . TBA
Final Exam	40%	TBA
Total	100%	

GRADING CRITERIA:

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

The recommended grade point average for a 100 level course at the University of Alberta is 2.6.

ADDITIONAL INFORMATION ON MARKING:

The lowest two homework assignments, and the lowest two lab assignments will be dropped and not included in the overall student grade. If a student misses the midterm exam, no make-up exam will be given, instead, the weight of the midterm exam will be added to the student's final exam.

COURSE SCHEDULE/TENTATIVE TIMELINE:

Week	Date	Topics	UofA Online Textbook sections	Note
1	01-Sep	Introduction to EG1300 Review of the basics Scalars and vectors	1.1-1.3 2.1	
2	Sep. 05 - 09	Vector addition Cartesian vector notation Addition of cartesian vectors Position vectors	2.2 2.4 2.5 2.6	HOA #1 due
3	Sep. 12 - 16	Force directed along a line Dot product	3.1 2.7	HOA #2 due Lab #1
4	Sep. 19 - 23	Particle equilibrium Free body diagrams co-planar and 3D force systems	5.1 4.4 4.2-4.3	HOA #3 due Lab #2
5	Sep. 26 - 30	Vector cross product moment of a force	2.8 3.2	HOA #4 due Lab #3
6	Oct. 3 - 7	Moment about an axis Moment of a couple Reduction of force and couple system	3.2.3 3.3 3.4	HOA #5 due Lab #4
7	Oct. 10 - 14	Reduction of simple distributed loads	3.5	HOA #6 due Lab #5
8	Oct. 17 - 21	Equilibrium in two dimensions Two and three-force members	5.2	HOA #7 due Lab #6
MIDTERM EXAM in the week of the 17-23. On weeks #3 to #7				

9	Oct. 24 - 28	Plane trusses Method of joints method of sections	6.1	HOA #8 due Lab #7
10	Oct. 31 - Nov. 4	Internal forces in members Shear force and bending moments (equations and diagrams)	7.1-7.2	HOA #9 due Lab #8
Reading week Nov. 7 - 11				
11	Nov. 14 - 18	Relationships between distributed load, shear force, and bending moment Graphical approach for diagrams	7.3 7.2	HOA #10 due Lab #9
12	Nov. 21 - 25	Centre of gravity, centroids, centroids by integration and composite bodies	9.1 - 9.3	HOA #11 due Lab #10
13	Nov. 28 - Dec. 2	Moment of inertia for areas Moment of inertia by integration Parallel axis theorem	10.1 10.3 - 10.4	HOA #12 due Lab #11
14	Dec. 05 - 08	Dry friction course review	8.1 - 8.2	Lab #12

STUDENT RESPONSIBILITIES:

CALCULATOR POLICY: Any calculator without communications features that is approved by UAlberta Engineering faculty (*e.g.* **TI-36XPro** / **TI-30XII**) may be used during EG1300 examinations. Smartphones, Blackberries, Tablets/Laptop computers *etc.* are prohibited. Cellular phones must be shut off during exams. All calculators with removable covers must have the covers removed and stored elsewhere during the exam.

LABORATORIES:

- The first lab starts in the third week of the semester
- Students will complete engineering calculations during each lab session. Bring the required tools *e.g.*, pencil, calculator, ruler(straight edge), engineering paper, stapler, etc.
- Labs must be completed on Engineering Paper and submitted, stapled, along with the question sheet, at the end of the lab session.
- Use appropriate significant figures. Circle and label your answers.
- All work submitted must be your own.
- The final grade will be on the best 10 out of 12 labs.
- Marks will be deducted for messy work, no title page, failing to circle and label answers, submitting on non-engineering paper or failing to staple pages together neatly.

Braden's Odds and Ends...

When writing exams, ensure that you bring your student I.D. with you, and that you write your student I.D. on each page of the examination. Do not write your name on each page, only your student I.D.

Exam attire: Headwear worn in a way that obstructs the invigilator from seeing the eyes of a student are not allowed. An example is brim-forward baseball caps. Baseball caps can be worn with brims facing backwards, like the cool kids wear them. Hoodies must have the hoods down. This is in part to ensure no Sith Lords take the exams. Dark or tinted eyewear are also not permitted during an exam without a doctor's note. This is not due to Corey Hart.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at <https://www.nwpolytech.ca/about/administration/policies/index.html>

**Note: all Academic and Administrative policies are available on the same page.