

COURSE OUTLINE – Fall 2023

EG1300 (A2): ENGINEERING MECHANICS – 4 (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: Dr. Braden Kelly **PHONE:** (780) 539-2963
OFFICE: J218 **E-MAIL:** bkelly@nwpolytech.ca
OFFICE HOURS: Unrestricted drop-in/by-appointment

CALENDAR DESCRIPTION:

Equilibrium of planar systems. Analysis of statically determinate trusses and frames. Friction. Centroids and centres of gravity. Forces and moments in beams. Second moments of area. **Restricted to Engineering students.**

COREQUISITE:

MA1000

REQUIRED TEXT/RESOURCE MATERIALS:

Hibbeler, R. C. - *Engineering Mechanics: Statics*. 15th Edition. Prentice Hall/Pearson.

RECOMENDED TEXT/RESOURCE MATERIALS:

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

Meriam, J. L. - *Engineering Mechanics: Statics*. SI Version, Wiley.

Sheppard, S. D. - *Engineering Mechanics: Statics*. Wiley.



DELIVERY MODE(S):

Lecture Monday & Tuesday 8:30 – 9:50am, room J201.

Lab L1: Wednesday 2:30–4:20pm, room J225.

Lab L2: Friday 2:30–4:20pm, room J203pm.

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 the 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.alberta.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.**

Final Exam Period:

The final exam period for Engineering will follow a modified schedule this year. Students in Engineering will have an exam period that is one (1) day longer than the official final exam period for NWP students.

EVALUATIONS:

Component	Weight	Comment
Assignments	10%	Weekly, submitted online or hardcopy. To Be Decided.
Lab assignments	20%	Assigned problems solved and handed in at end of each lab.
Midterm Exam	30%	TBD
Final Exam	40%	TBA, Cumulative exam.
Total	100%	

GRADING CRITERIA:

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	95-100	C+	2.3	67-69
A	4.0	85-94	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

COURSE SCHEDULE/TENTATIVE TIMELINE:

Week	Date	Topics	UofA Textbook sections	Hibbeler	Note
1	Sep. 04 - 08	Vector addition Cartesian vector notation Addition of cartesian vectors Position vectors	2.2 2.4 2.5 2.6	Chapter 1,2	
2	Sep. 11 - 15	Force directed along a line Dot product	3.1 2.7	Chapter 2	HOA #1 due Lab #1
3	Sep. 18 - 22	Particle equilibrium Free body diagrams co-planar and 3D force systems	5.1 4.4 4.2-4.3	Chapter 3	HOA #2 due Lab #2
4	Sep. 25 - 29	Vector cross product moment of a force	2.8 3.2	Chapter 4	HOA #3 due Lab #3
5	Oct. 02 - 06	Moment about an axis Moment of a couple Reduction of force and couple system	3.2.3 3.3 3.4	Chapter 4	HOA #4 due Lab #4
6	Oct. 09- 13	Reduction of simple distributed loads	3.5	Chapter 4	HOA #5 due Lab #5
MIDTERM EXAM TBD					
7	Oct. 16 - 20	Equilibrium in two dimensions Two and three-force members	5.2	Chapter 5	HOA #6 due Lab #6
8	Oct. 23 - 27	Plane trusses Method of joints method of sections	6.1	Chapter 6	HOA #7 due Lab #7
9	Oct. 30 - Nov. 3	Internal forces in members Shear force and bending moments (equations and diagrams)	7.1-7.2	Chapter 7	HOA #8 due Lab #8
10	Nov. 06 - 10	Relationships between distributed load, shear force, and bending moment Graphical approach for diagrams	7.3 7.2	Chapter 7	HOA #9 due Lab #9
11	Nov. 13 - 17	Reading Week			
12	Nov. 20 - 24	Centre of gravity, centroids, centroids by integration and composite bodies	9.1 - 9.3	Chapter 9	HOA #10 due Lab #10
13	Nov. 27 - Dec. 1	Moment of inertia for areas Moment of inertia by integration Parallel axis theorem	10.1 10.3 - 10.4	Chapter 10	HOA #11 due Lab #11

14	Dec. 04 - 08	Dry friction	8.1 - 8.2	Chapter 8	HOA #12 due Lab #12
15	Dec. 11	course review			HOA #13 due

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 second 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. Labs marked 0 will not be eligible for removal from the average.
- 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.

STATEMENT ON ACADEMIC MISCONDUCT:

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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

Additional Information:

Any work handed in late will receive a grade of zero and will not be marked.