

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Winter 2023

PC1310 (A3): Mechanics – 4 (3-1-1.5) UT

82.5 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
OFFICE: J218
OFFICE HOURS: TBA

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CALENDAR DESCRIPTION:

This course includes kinematics and dynamics of particles; gravitation; work and energy; linear momentum; angular momentum; systems of particles and introduction to dynamics of rigid bodies.

PREREQUISITE(S)/COREQUISITE:

Pre-requisites: MA1000, PC1300, and EG1300

Co-requisites: MA1010

REQUIRED TEXT/RESOURCE MATERIALS:

Engineering Mechanics: Dynamics, 15th Ed., R.C. Hibbeler, Publisher: Prentice Hall (Required), PC1310 Laboratory Manual (Required) – available on D2L, Fundamentals of Physics, 11th Ed. Authors: Halliday, Resnick & Walker, Publisher: Wiley (Reference). Older version of both Hibbeler and Fundamentals of Physics are readily available, often at discount prices and have all the necessary material.

DELIVERY MODE(S):

- Lectures, labs and seminar.

COURSE OBJECTIVES:

- The Instructor will provide a calculus-based understanding of the Basic Kinematics and the Basic Dynamics as applied to the 1-D and 2-D behavior of rigid body particles in motion. The students will be shown how to use a Free Body Diagram to calculate the behavior of particles or a system of particles and the associated translational and rotational momentum, work and energy. Laboratory Experiments will be conducted to verify the principles presented in class.

LEARNING OUTCOMES:

- Students will have the knowledge to be able to analyze the rectilinear and curvilinear motion of rigid particles in 1-D and 2-D under the influence of forces. They will be able to calculate such a particle's linear and angular momentum, work and energy. Students will know and be able to explain the underlying basis for general planar kinetics

TRANSFERABILITY:

University of Alberta, Augustana Faculty, Concordia University College, King's University College, Burman University.

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:

Evaluations are subject to change. Final syllabus will be uploaded to D2L by the end of the second week.

Assignments	5%	Due at start of Seminar each week
Seminars	10%	Engineering Paper required
Labs	15%	Must pass the lab with a minimum of 50% to pass the course
Midterm Exam	30%	TBD
Final Exam (Comprehensive)	40%	TBD

Formula Sheets will be provided by the instructor for the Midterm and Final examinations. There will be no makeup midterm. Students who miss the midterm due to a valid reason, such as illness, will have the weight shifted to the final exam. A doctors note is required for illness related issues. The final examination will be comprehensive and cover all of the material of the course. Only calculators acceptable at the University of Alberta are allowed in the midterm or final examinations. See section further down for information on the seminars.

GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

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	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

COURSE SCHEDULE/TENTATIVE TIMELINE:

Topic	Sections in Hibbeler	Equivalent Sections in HRW
Introductory material	1.1-1.5 (Hibbeler Dynamics)	1.1-1.7
Kinematics of Rectilinear Motion	12.1-12,3	2.1-2.10
Kinematic of Planar Motion	12.4-12.7, 12.9, 12.10	4.1-4.9
Dynamics of a Particle	13.1-13.5	5.1-5.9, 6.1-6.5
Work and Energy	14.1-14.6	7.1-7.9, 8.1-8.8
Linear Momentum and Impulse	15.1-15.4	9.1-9.12
Angular Impulse and Momentum	15.5-15.7	11.7-11.1
Introduction to Kinematics and Dynamics of a Rigid Body	16.1-16.3, 17.1-17.5, 18.1	10.1-10.6, 11.1-11.6

The schedule is subject to change. Updates will be made to the online course outline found on D2L.

LABORATORY WORK:

Experiment Number	Title
6	Acceleration Due to Gravity
7	Non-Uniform Motion
8	Conservation of Energy
9	Collision: Ramp
10	Moment of Inertia

The labs are subject to change as the University of Alberta has made several changes to their lab offerings in the past 2 years.

Lab reports are due at the start of the weekly seminar following the lab i.e., Monday morning at 8:30 am. Late assignments will receive a mark of zero and will not be graded. Students must achieve a score of at least 50% on the laboratory component of the course in order to pass the course.

SEMINARS:

These are approximately one-hour sessions held weekly in which students will be required to solve several problems. The problems will be handed in at the end of the seminar period for marking. Late submission will not be accepted and will receive a grade of zero. Limited help in solving these problems will be available from the seminar instructor. Students are allowed to bring their notes and textbooks. Electronic devices (cell phones, laptops, tablets etc) are only permitted for accessing local copies of the textbook. No internet access is allowed during the seminars.

STUDENT RESPONSIBILITIES:

Students are responsible for all lecture, seminar and lab material, and readings. Students are expected to practice the material by doing textbook examples as well as problems at the end of every section covered. Bring your own supplies including a stapler and calculator batteries.

CALCULATOR POLICY: Only non-programmable or programmable calculators approved by the Faculty of Engineering are allowed in tests and exams. Using an improper calculator or other devices/software in an exam/test is considered cheating

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 Northwestern Polytechnic Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the Student Rights and Responsibilities policy which can be found at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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

Additional Information (Optional):

Engineers Rule The World (ERTW).