

**ENPHY 131A - Mechanics**

3 Credits, 3 hours lecture. 3 hours lab (every other week), 1 hour tutorial 4.3 Engineering Units (UofA)

Kinematics and dynamics of particles, gravitation, work and energy, linear momentum, angular momentum, systems of particles, introduction to dynamics of rigid bodies, accompanied by related laboratory work.

*Prerequisites and/or co-requisites: MATH 100, MATH 101, PHYS 1130, ENGG 130.*

**Instructors**

Robert Changirwa

S211B

(780) 791-4940

[Robert.Changirwa@keyano.ca](mailto:Robert.Changirwa@keyano.ca)

**Office Hours**

Monday 11:00 - 11:50

Tuesday 12:00 - 13:50

Wednesday 13:00 - 14:50

**Hours of Instruction**

Monday: 14:00-15:20, Room CC239 (Lectures)

Friday: 14:00-15:20, Room CC239 (Lectures)

Monday 10:00-11:50, Room CC239 (Tutorials)

Thursday 14:00-16:50, Room CC239 (Labs)

**Required Resources**

- **Engineering Mechanics: Statics and Dynamics**, R.C. Hibbeler. Singapore – Pearson, 2015 (14th edition, with Mastering Engineering)
- Engineering notepad for tutorials, Lecture Notebook and separate bound notebook for assignments

**Course Outcomes**

Upon successful completion of this course, the student shall be able to:

- Carry out idealization of a physical system, and know how to set up and solve the equations to solve a dynamics problem.
- Draw a free-body diagram of a rigid body and develop the equations of motion.
- Calculate kinematic equations in different 2D and 3D coordinate systems.
- Apply the techniques of work/energy and impulse/momentum to dynamical problems

**Evaluation**

<b>Assessment</b>	<b>Weight</b>
Assignments	2.5%
Tutorials	7.5%
Labs	20%
Midterm Exam	25%
Final Exam	45%
<b>TOTAL</b>	<b>100%</b>

*A grade of C- is required for progression or transfer.*

**Assignments**

It is important to start the problems early and not put them off until the day before they are due. This course uses web-based assignments: you will need to use the Mastering Engineering access kit purchased with your textbook to access the assignments; instructions will be provided in the first lecture. Assignments must be completed via the Mastering Engineering web site before the posted due dates; partially completed assignments receive the score achieved before the due date.

- You are expected to keep fully worked out solutions to your assignments in a bound notebook; your instructor may ask to see these solutions at any time, and you should be prepared to produce these solutions when demanded. The best approach is to have your solution book with you during lectures, labs, and tutorials.
- You may rework assignments after the due date for practice purposes; this will have no effect on your score.
- Accurate sketches and correct free body diagrams (FBDs) are a must and are emphasized in all work. The FBD is the single most important tool for the solution of mechanics problems. The important elements of a good problem-solving technique are:
  - correct problem set-up with the assumptions and what is sought,
  - correct analysis with appropriate diagrams,
  - correct numbers and units, and
  - proper interpretation of the solution in both units and directions.
- NOTE: missed or incomplete assignments may result in a grade of F for the course

**Tutorials**

Tutorials are designed to help you develop your problem solving skills by having you work out a complete, written solution to a textbook problem or selected reading from your text under the guidance of your instructor. Assessment of this component will be based on the quality and clarity of the written solution (getting the correct answer is not a significant component of the assessment). Tutorial assignments are due at the end of the tutorial period, unless otherwise indicated. You are expected to work on tutorial problems by yourself, though you may discuss your work with your instructor or a classmate; collaborative solutions are not allowed unless explicitly stated by your instructor.

**Laboratory Work:**

- Students must keep a proper record of experimental results in a hardcover physics laboratory manual (available at bookstore). **IF YOU DO NOT BRING YOUR LOGBOOK TO A LAB, YOU WILL BE EXCUSED FROM THE LAB.**
- Laboratory attendance is compulsory and no unexcused absences will be tolerated. An unexcused absence will result in a grade of zero for the missed lab and may result in course failure. See attendance policy.
- A properly formatted laboratory report produced using Microsoft Word and Excel is to be prepared by the due date indicated by your instructor.
- Pre-lab: you are expected to arrive at a lab having read all advance material (posted on iLearn). A pre-lab exercise is due before the start of the lab period. If this exercise is not completed by the deadline, it must be completed during the lab period; the remaining time in the lab period will then be available for the experiment.
- A passing grade must be obtained in the lab portion of the course in order to pass the course. Specifically, students must achieve a 50% or greater aggregate score on lab reports in order to avoid an automatic grade of F. If a passing grade is obtained in the lab component, then a grade is assigned a grade based on term work using the weighting given above.

**Exams**

There will be one midterm exam and a final exam in this course. The midterm exam takes place during a lab period in the seventh week. The midterm will cover all topics covered up to the date of the exam. The two-hour final exam will take place during the exam period at the end of the term. The final exam is a closed book test where you are expected to demonstrate mastery of the subject. You will be expected to solve a set of problems, some similar to work you have previously done, some more challenging. The assignments and labs are designed to help you prepare for this examination, so make sure you take full advantage of these exercises to prepare for the final.

For all exams, you are expected to know fundamental relations and physical laws. No formula sheet will be supplied, although some hints may be given in some problems where a specialized identity or relation may be required. Only simple scientific calculators are allowed during examinations.

**Grading System**

<b>Descriptor</b>	<b>Alpha Grade</b>	<b>4.0 Scale</b>	<b>Percent</b>	<b>Rubric for Letter Grades</b>
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory <b>Progression</b>	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	C-	1.7	60 – 63.9	
Poor	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
<b>Minimum Pass</b>	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

**Proposed Schedule of Topics**

Wk	Chapter	Main Topics	Lab/Tutorial
1	12.1-12.4	<b>Kinematics of a particle:</b> - rectilinear, erratic, curvilinear motion	
2	12.5-12.7	<b>Kinematics of a particle:</b> - curvilinear coordinates; projectiles - curvilinear motion: normal/tangential comp.	M2-Non-uniform Motion
3	12.8-12.10	<b>Kinematics of a particle:</b> - cylindrical components, motion of two particles	
4	13.1-13.4	<b>Force &amp; Acceleration:</b> - Newton's Laws of Motion - Equations of motion, systems of particles	F3 - Terminal velocity
5	13.5-13.6	<b>Force &amp; Acceleration:</b> - Newton's Laws of Motion, coordinate systems	
6	14.1-14.4	<b>Work &amp; Energy:</b> - work done by a force, energy, power, efficiency	M3 - Friction
7	Review	Family Day; Midterm Review; Midterm	
8	14.5-14.6	<b>Work &amp; Energy:</b> - conservative forces and potential energy - conservation of energy	M4 - Pulleys
9	15.1-15.3	<b>Impulse &amp; Momentum:</b> - Linear impulse and momentum defined - Cons. of momentum: systems of particles	
10	15.4	<b>Impulse &amp; Momentum:</b> - Collisions	M5 - Collisions
11	16.1-16.3	<b>Rigid Body Kinematics:</b> - rotational motion - moment of inertia, torque, rotational energy	
12	17	<b>Rigid Body Dynamics:</b> - rolling motion, Newton's 2nd law, work and power	M7 - Yo-yo Dynamics
13	18.1-18.3	<b>Rigid Body Dynamics:</b> - energy	
14	15.5-15.7 19.1-19.3	<b>Rigid Body Dynamics:</b> - angular momentum, precession	

**Please Note:**

Date and time allotted to each topic is subject to change.

## Performance Requirements and Student Services

### Student Responsibilities

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the [Keyano College credit calendar](#). The Keyano College credit calendar also has information about Student Rights and Code of Conduct. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Code of Conduct Policies.

### Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a student's learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and notes that may be due.

### Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own;
- The use of unauthorized aids in assignments or examinations (cheating);
- Collusion or the unauthorized collaboration with others in preparing work;
- The deliberate misrepresentation of qualifications;
- The willful distortion of results or data;
- Substitution in an examination by another person;
- Handing in the same unchanged work as submitted for another assignment; and
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, [you must successfully complete the online tutorial found on \[ilearn.keyano.ca\]\(http://ilearn.keyano.ca\). Then print the certificate, sign it, and show it to each of your instructors.](#) Your course work may not be graded until you show this signed certificate.

### Specialized Supports

The Student Services department is committed to Keyano students and their academic success. There are a variety of student supports available at Keyano College. Due to the continuing situation with the Covid-19 pandemic, the offered support services will be implemented differently this semester by being provided mostly virtually. In-person service can be requested as needed. All Alberta Health Services guidelines will be followed for in-person appointments—wear a mask, maintain two meters of physical distance, use hand sanitizer, and stay home if you are unwell.

All student services are available during Keyano business hours: Monday to Friday, 8h30-16h30.

**Accessibility Services:** provides accommodations for students with disabilities. Students with documented disabilities, or who suspect a disability, can meet with a Learning Strategist to discuss their current learning barriers and possible accommodations. Students who have accessed

accommodations in the past are encouraged to contact us to request them for the semester. Please note that requesting accommodations is a process and requires time to arrange. Contact us as soon as you know you may require accommodations. For accessibility services supports and to book a virtual appointment, please contact [accessibility.services@keyano.ca](mailto:accessibility.services@keyano.ca).

Accessibility Services also provides individual and group learning strategy instruction for all students, as well as technology training and supports to enhance learning. Meet with a Learning Strategist to learn studying and test-taking strategies for online classes. Schedule an appointment with the Assistive Technology Specialist to explore technology tools for learning. Book an appointment today by emailing [accessibility.services@keyano.ca](mailto:accessibility.services@keyano.ca)

**Wellness Services:** offers a caring, inclusive, and respectful environment where students can access free group and individual support to meet academic and life challenges. Mental Health Coordinators offer a safe and confidential environment to seek help with personal concerns. All individual appointments will continue virtually.

Wellness Services welcomes students to participate in any of the virtual group sessions offered throughout the academic year addressing topics including mindfulness and test anxiety.

Individual virtual appointments can be made by emailing [wellness.services@keyano.ca](mailto:wellness.services@keyano.ca).

**Library Services:** provides students with research and information supports as they engage in their studies. Library staff are available to support you both virtually and in person throughout the semester. For a detailed list of library supports and services, go to [www.keyano.ca/library](http://www.keyano.ca/library). For any inquiries, please email [askthelibrary@keyano.ca](mailto:askthelibrary@keyano.ca).

Begin your research with the [Library's FIND page](#). Search for sources using OneSearch, the Library's Catalogue, or by searching in a specific database selected from the [A-Z Database List](#).

Individual support with the Information Librarian is available virtually. Appointments can be requested by using the [Book A Librarian online form](#).

Research and Subject Guides are helpful resources when beginning your research or addressing other information needs. To view a subject or course specific guide, go to the Subject Guide webpage [here](#).

To access additional research resources, including Citation Guides (APA, MLA, Chicago, or IEEE), go to the [Research Help Library page](#).

The Loanable Technology collection is available to support students in their online learning pursuits. Items available for borrowing include mobile projectors, webcams, noise cancelling headphones, Chromebooks, and laptops. For an up-to-date list of technology available for borrowing, go to the Library's [Loanable Technology webpage](#).

**Skill Centre:** Provides academic support services to students registered in credit programs at Keyano College in the form of tutoring, assignment/lab support, writing support groups, facilitated study groups, workshops, and study space. This service is free and is available for all Math, Sciences, Humanities and Trades courses offered at Keyano.

While most courses are being offered online, the Skill Centre will be offering mostly virtual services and in-person sessions as requested. Please email [Skill@keyano.ca](mailto:Skill@keyano.ca) to get in contact with our Academic Content Specialists. The Skill Centre is located in CC-119 at the Clearwater Campus.

For the most up to date information on how to book a session, please view the [Keyano Skill Centre homepage](#).

**Academic Success Coaching:** offers you support and access to resources for your academic success to help you to find the Keys to your Success. The Academic Success Coach will work with you to develop an academic success plan, develop your study and time management skills, and connect you with the right resources here at Keyano. [Academic.success@keyano.ca](mailto:Academic.success@keyano.ca) is the best way to access resources during virtual service delivery. The Academic Success Coach is located in the Skill Centre in CC-119 at the Clearwater Campus.

### E-Learning

Technology and internet will impact your online learning experience. It's important that you are able to watch an online video and other course materials, take online quizzes, and participate in a live class with your instructor and other students.

Keyano College operates in a Windows based environment and having the correct tools for online learning is important. Here's a list of recommended system requirements.

### Internet Speed

Minimum Internet speeds of 5 Mbps.

Recommended Internet speeds of 25 Mbps (especially if you are sharing your internet at home).

Check your internet speed with [Fast.com](http://Fast.com).

### System requirements:

Microsoft Windows	Apple
<p><b>Minimum Requirements:</b></p> <ul style="list-style-type: none"> <li>· A Windows 10 <b>computer/laptop</b></li> <li>· Minimum 4GB of RAM.</li> <li>· 10GB+ available hard drive storage.</li> <li>· Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>· Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>· System updates must be regularly installed.</li> <li>· Anti-Virus / Anti-Malware software</li> </ul>	<p><b>Minimum Requirements:</b></p> <ul style="list-style-type: none"> <li>· A Macintosh (V10.14 and above) <b>computer/laptop</b></li> <li>· Minimum 4GB of RAM.</li> <li>· 10GB+ available hard drive storage.</li> <li>· Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>· Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>· System updates must be regularly installed.</li> <li>· Anti-Virus / Anti-Malware software.</li> </ul>
<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>· 8GB of RAM</li> <li>· A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.</li> </ul>	<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>· 8GB of RAM</li> <li>· A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.</li> </ul>

Chromebooks are **not** recommended as they are not compatible with testing lockdown browsers.

A Microsoft Surface or iPad or iPad Pro may be possible alternatives in some program areas.

**Specific Department Requirements:**

Business and OA programs require Windows 10.

Other programs may utilize Windows based tools as well.

**Computer Software**

Students will be able to get access to Microsoft Office 365 for free using Keyano credentials by [clicking here](#).

**Recording of Lectures and Intellectual Property**

Students may only record a lecture if explicit permission is provided by the instructor or by Accessibility Services. Even if students have permission to record a lecture or lecture materials, students may not share, distribute, or publish any of the lectures or lecture materials, this includes any recordings, slides, instructor notes, etc. on any platform. Thus no student is allowed to share, distribute, publish or sell course related content (instructor, or students) without permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property. The [Academic Integrity Policy](#) provides additional information on Keyano College's expectations from students as members of the intellectual community.

**ITS Helpdesk**

If you are having issues with your student account, you can contact the ITS Helpdesk by emailing [its.helpdesk@keyano.ca](mailto:its.helpdesk@keyano.ca) or calling 780-791-4965.