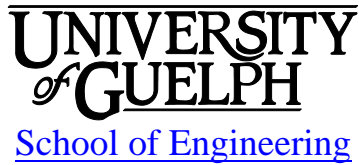


ENGG*2340 Kinematics and Dynamics

Winter 2016



(Revision 1: January 24, 2016, **Assignment 1 due date is changed**)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Fantahun M. Defersha, PhD. PEng.
Office: THRN 2403, ext. 56512
Email: fdefersh@uoguelph.ca
Office hours: Monday 9:30 am to 12:00 pm or by appointment

1.2 Teaching Assistants

- "Nihad" noleiwi@uoguelph.ca
- "Fatemeh" fmohebal@uoguelph.ca
- "Bharat" bregmi@uoguelph.ca
- "Wisam" walwajid@uoguelph.ca

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*2340 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources (Textbook)

- W. L. Cleghorn (2014, 2nd ed) . Mechanics of Machines; OXFORD UNIVERSITY PRESS; New York;

2.3 Recommended Resources

- John J. Uicker, JR., Gordon R. Pennock, and Joseph E., Shigley (2010). Theory of machines and mechanisms, 4ed, OXFORD UNIVERSITY PRESS, New York.

2.4 Additional Resources

Lecture Information: Selected lecture notes are posted on CourseLink. The lecture is the primary source of information for the course and certain topics will be more elaborated than presented in the text book. Discussion and Examples that may not be available from the text book will also be presented during the lecture time to help you further understand the subject matter of the various topics. As such it is highly recommended that you attend the lectures.

Miscellaneous Information: None.

2.5 Communication & Email Policy:

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. It is your responsibility to check the course website regularly. As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student. When you send an email to the instructor or to a TA, please include the course number (ENGG*2340) in the subject of the email.

3 ASSESSMENT

3.1 Dates and Distribution

Labs: 10 %

The laboratory sections are intended to introduce students the used computer tools for graphical and analytical kinematics and dynamics analysis of mechanism. Students are required to submit their laboratory work using designated shared folders.

Assignment: 10%.

This includes problem solving both using hand calculation and computer.

Assignment Due Dates

- **Assignment 1, Feb 05 (in class)**
- Assignment 2, February 22 (in class)
- Assignment 3, March 18 (in class)
- Assignment 4, April 01 (in class)

Mid-term: 30 %

Feb 26, in class (Part-1)

March 04, in class (Part-2)

Final Exam: 50%

Friday, April 15, 2016; Time: 2:30 pm- 4:30 pm, Room TBA

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Passing grade: Students must obtain a grade of 50% to pass this course.

Missed quiz and midterm tests: If you miss a quiz due to grounds for granting academic consideration or religious accommodation, the weight of the missed quiz will be added to the final exam. There will be makeup for missed midterm if academic consideration is granted.

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab.

Late Lab Reports: Late submissions of lab reports will not be accepted. Students are required to submit their computer based laboratory work using designated shared folders.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

The course will cover kinematic and dynamic analysis including graphical and analytical methods for kinematic analysis of space, mechanisms and elementary body motion in space, static and dynamic force analyses of mechanisms, gyroscopic forces, dynamics of reciprocating and rotating machinery, cam and gear mechanisms and specifications.. Prerequisite(s): ENGG*2160

4.2 Course Aims

The course is aimed at introduction students the fundamentals of kinematics and dynamics analysis of mechanism.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Understand motion generated by different types mechanisms
2. Construct displacement, velocity and acceleration vector diagrams and solve them graphically and analytically

3. Apply the concepts of displacement, velocity, and acceleration to solve mechanical problems
4. Analyse both static and dynamic forces on machine components
5. Analyze the Design of cams
6. Understand the fundamentals of gears and gear trains
7. Use CAD software, MATLAB and Working Model 2D for kinematics and dynamics analysis of mechanisms.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1	Assignment , Quizzes, Exams
2. Problem Analysis	2, 3, 4	Assignment , Quizzes, Exams
3. Investigation	3	Assignment , Quizzes, Exams
4. Design	5, 6	Assignment , Quizzes, Exams
5. Use of Engineering Tools	7	Lab, Assignment
6. Communication		Assignment
7. Individual and Teamwork		
8. Professionalism		
9. Impact of Engineering on Society and the Environment		
10. Ethics and Equity		
11. Environment, Society, Business, & Project Management		
12. Life-Long Learning		

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sections. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate. The best leaning

experience will be achieved if you *attend lecture and lab regularly*. Scientific studies have proven that a student success rate is strongly related to his/her class attendance. Those who attend classes, tutorials and labs have higher success rates than those who do not.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*1210 (Engineering Mechanics I): The fundamental principles of Newtonian mechanics covered in ENGG*1210 are the basis for the various topics to be covered in ENGG*2340

Follow-on Courses:

ENGG*3280 (Machine Design): The design of various mechanical elements requires the knowledge of the kinematics and dynamics of the mechanisms in which these mechanical elements are used.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:			
Monday		08:30 AM– 09:20 AM	RICH 2520
Wednesday		08:30 AM– 09:20 AM	RICH 2520
Friday		08:30 AM– 09:20 AM	RICH 2520
Lab:			
Section 1	Monday	11:30 AM – 2:20 PM	THRN 1313
Section 2	Tuesday	11:30 AM – 2:20 PM	THRN 1313
Section 3	Wednesday	11:30 AM – 2:20 PM	THRN 1313
Section 4	Thursday	11:30 AM – 2:20 PM	THRN 1313
Section 5	Friday	11:30 AM – 2:20 PM	THRN 1313

5.2 Lecture Schedule

Week	Lecture Topics	References	Learning Objectives
1	Revision of kinematics of rigid bodies ENGG*1210	Lecture Slide	1, 2, 3
1, 2	Graphical and Vector Analysis of Relative Velocity	Chapter 2, Chapter 3, Lecture Note	1, 2, 3
3-5	Graphical and Vector Analysis of Relative Acceleration	Chapter 2, Chapter 3, Lecture Note	1, 2, 3

6	Complex Vector Analysis of planar mechanism	Chapter 4	1, 2, 3
7	Dynamic Force Analysis	Lecture Note	4
8 -9	Cam Analysis and Design	Chapter 7, Lecture Slide	5
10-11	Gears	Chapter 6	6
12	Gear Train	Chapter 7	6

5.3 Lab Schedule

Week	Theme
3	Graphical Position and Velocity Analysis using AutoCAD
4	Graphical Acceleration Analysis using AutoCAD
5	Position and Velocity Analysis using MATLAB
6	No Lab this week
7	Solving problem with Coriolis components acceleration both graphically (AutoCAD) and analytically (MATLAB)
8	Analytical force analysis (MATLAB)
9	Introduction to Working Model 2D
10	Exercise on Working Model 2D

5.4 Important Dates

Please refer to the undergraduate calendar 2014-2015 for scheduled dates at:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/c03-wintersem.shtml>

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

8 ACCESSIBILITY:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible