
CIVE 242 – Dynamics (301200)**Term – Summer 2020 (202005)**

We acknowledge with respect the Lekwungen peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

Instructor name**Dr. Sardar Malekmohammadi**

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Office: EOW 329

Office Hours

Days: Wednesday (by appointments)

Time: 10:30 am - 11:20 am

Location: Zoom

Prerequisites:

MATH 100, MATH 101, MATH 110, PHYS 122, ENGR 141, MATH 201

Course Objectives

The objective of this course is to introduce the methods used to analyze the movement of a system of interconnected bodies (i.e. a “mechanism”) under the action of applied forces and moments. More specifically, given the geometry, mass distribution, connections, and configuration of the mechanism, and given the input velocities and the applied forces and moments, this course will teach the student how to determine the velocities and accelerations of all bodies in the system, and how to determine the reaction forces and moments at all connections. The analysis is limited to one degree of freedom mechanisms undergoing planar motion. The concepts presented in this course require understanding of fundamental concepts from other courses, including MATH 100, MATH 101, MATH 110, PHYS 122, ENGR 141, MATH 201.

Learning Outcomes

Students who successfully complete this course will be able to:

1. Write the velocity and acceleration relationships that describe the kinematic constraints imposed on a planar mechanism by all its connections.
2. Derive relationships between the velocities and accelerations of any two points on a planar mechanism.
3. Use analytical and graphical methods to solve planar velocity and acceleration equations.
4. Determine the velocity and acceleration of any point, and the angular velocity and angular acceleration of any body, of a planar mechanism with given input motion.
5. Draw free-body and kinetic diagram for all bodies of a planar mechanism.
6. Explain how each connection of a rigid body is represented in the free-body and kinetic diagram of the respective body.
7. Identify the relationships that need to be added to a partial solution of a planar rigid body dynamics problem to complete the mathematical modeling of the corresponding physical system.

- Determine the acceleration and velocity of any point, and the angular acceleration and angular velocity of any body, of a planar mechanism given the initial state of the mechanism and the forces and pure moments applied on it.

Syllabus

- Kinematics of planar rigid body motion (Hibbeler – Ch. 16)
 - Review of particle kinematics.
 - Kinematics of planar rigid body motion using translating axes.
 - Instantaneous center of zero velocity.
 - Kinematics of planar rigid body motion using rotating axes.
- Force and acceleration method for rigid bodies in planar motion (Hibbeler – Ch. 17)
 - Review of particle kinetics.
 - Review of moments of inertia.
 - Kinetic equations of planar motion.
 - Rolling.
- Work and energy method for rigid bodies in planar motion (Hibbeler – Ch. 18)
 - Kinetic energy.
 - Work of a force and of a pure moment.
 - Conservative and non-conservative force fields. Potential energy.
 - Principle of work and energy. Conservation of energy.
- Impulse and momentum method for rigid bodies in planar motion (Hibbeler – Ch. 19)
 - Linear and angular momentum.
 - Principle of impulse and momentum.
 - Conservation of momentum.
 - Impact.

A-Section(s): A01/CRN 30120
Days: Tue-Wed-Fri
Time: 9:30 am - 10:20 am
Location: Zoom

TAs: Shervin Shameli (shervin.shameli@gmail.com)
Ariya Eini (ariaeini@gmail.com)

Required Text

Title: Engineering Mechanics – Dynamics
Author: R.C. Hibbeler
Publisher: Prentice Hall
Year: 2015 (14th Edition)

References

- Engineering Mechanics: Dynamics, 14th Edition, R.C. Hibbeler, Prentice Hall.
- Engineering Mechanics: Dynamics, 9th Edition, James L. Meriam, L. G. Kraige, J. N. Bolton, Wiley.
- Lecture Notes (CourseSpaces).

Assessment

Assignments: 40% Due Dates: May 29, Jun 12, Jul 3, Jul 31

Quiz 1	4%	Date: June 6, 2020
Quiz 2	4%	Date: May 12, 2020
Quiz 3	4%	Date: May 26, 2020
Quiz 4	4%	Date: June 9, 2020
Quiz 5	4%	Date: June 23, 2020
Quiz 6 ⁽¹⁾	4%	Date: July 7, 2020
Quiz 7 ⁽¹⁾	4%	Date: July 21, 2020

Final Exam 40% Date: TBA

NOTE:

1. There are 7 online Quizzes (10-15 minutes). Each quiz consists of 4 multiple choice/short answer questions. Only the top 5 marks of all 7 quizzes are considered.
2. There are 4 Assignments (3-4 questions per assignment). Please submit your assignment electronically in **PDF** version with the name "V12345678-A#.pdf" to CourseSpaces by the due date.
3. Failure to pass the final exam (minimum 50%) will result in a failing grade for the course.
4. There will be **NO** supplemental examination for this course.
5. Coursework mark appeals: all marks must be appealed within 7-9 days of the mark being posted.
6. Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Course Withdrawal Deadlines:

- May 16: Withdrawal with 100% reduction of tuition fees
- June 6: Withdrawal with 50% reduction of tuition fees
- July 1: Last day for withdrawal (no fees returned)

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

There will be no supplemental examination for this course.

Grading: Please see the Grading information in the current calendar at: <https://www.uvic.ca/calendar2020-05/undergrad/index.php/home#/policies>

Course policies and guidelines

Late Assignments: *No late assignments will be accepted unless prior arrangements have been made with the instructor at least 48 hours before the assignment due date.*

Coursework Mark Appeals: *All marks must be appealed within 7-9 days of the mark being posted.*

Attendance: We expect students attend all lectures and labs. It is entirely the students' responsibility to recover any information or announcements presented in lectures from which they were absent.

Electronic devices in labs and lectures: No unauthorized *audio* or *video* recording of lectures is permitted.

Plagiarism: Submitted work may be checked using plagiarism detection software. Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the link given below for the UVic policy on academic integrity. Note that the university policy includes the statement that "*A largely or fully plagiarized assignment should result in a grade of F for the course.*"

Academic Integrity: You must make yourself aware of the University of Victoria guidelines and policy concerning fraud and academic integrity at this link, <https://www.uvic.ca/current-students/home/academics/academic-integrity/index.php>

Policy on Academic Integrity: <https://www.uvic.ca/calendar2020-05/undergrad/index.php#/policies>

Standards of Professional Behaviour: You are advised to read the Faculty of Engineering Document Standards for Professional Behaviour in current Undergraduate Calendar, which contains important information regarding conduct in courses, labs, and in the general use of facilities. Please find the document at this link: <https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Notes to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

University of Victoria Privacy Policy: If any student has concerns about their private information being stored or accessed outside of Canada, they are required to inform the course instructor about their concerns before the end of second week of classes.

Accommodation of Religious Observance: See entry in current Undergraduate Calendar.

Equality: This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building, <https://www.uvic.ca/services/cal/>.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Sexualized Violence Prevention and Response at UVic: UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119
Phone: 250.721.8021
Email: svpcoordinator@uvic.ca
Web: www.uvic.ca/svp

Policy on Inclusivity and Diversity: See the entry in the current Undergraduate Calendar.

Course Lecture Notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Syllabus statement

A note to remind you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone.

Counselling Services - *Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students.*

<https://www.uvic.ca/services/counselling/>

Health Services - *University Health Services (UHS) provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives.* <http://www.uvic.ca/services/health/>

Centre for Accessible Learning - *The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations* <https://www.uvic.ca/services/cal/>. *The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.*

Elders' Voices - *The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty and administration in Indigenous ways of knowing and being.*

<https://www.uvic.ca/services/indigenous/students/programming/elders/index.php>

The **Office of the Ombudsperson** is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations.

Phone: 250-721-8357; Email: ombuddy@uvic.ca; Web: uvicombudsperson.ca.