Faculty of Engineering

Department of Mechanical Engineering

COURSE OUTLINE

MECH 335 – Theory of Mechanism

Term – SPRING 2015 (201501)

Instructor	**Office Hours**
Dr. Ramtin Rakhsha	Days: Mondays
Phone: 250-472-5096	Time: 11:30-12:30pm
E-mail: rrakhsha@uvic.ca	Location: ELW A238

List all prerequisites and co-requisites: **MECH 242**

LECTURE DATE(S)

Section: A01 /CRN22186	Days: MTh	Time: 14:30 – 15:50	Location: : Bob Wright Center A104

TUTORIAL SECTIONS

Section: T01	Days: W	Time: 12:30 – 1:20	Location: Elliott Building 168

LAB SECTIONS

Section: B01, B02, B03, B04, B05, B06 / CRN 22187, 22188, 22189, 22190, 22191, 22192	Days: M, W, W, F, F, F	Time: 1:00 – 2:20 pm, 4:30-5:50 pm, 6:00 – 7:20 pm, 12:30 pm – 1:50 pm, 2:00 – 3:20 pm, 3:30 – 4:50 pm	Location: ELW B228, A229
Lab #1: Windshield Wiper Design			
Lab #2: Transport Mechanism Design			
Lab #3: Steering Mechanism Design			
Lab #4: Cam Design			

Lab times and locations are also available from the timetable through Sign in to UVic - My Page.

TA Name	**E-mail**	**Office/Phone**
Pouya Amid	pamid@uvic.ca	ELW A242, (250) 853 3200
Kaveh Nazeri	nazerik@uvic.ca	ELW A250
Xizhe Sun	sunxizhe@uvic.ca	ELW A233, (250) 853 3220
Hongbo Zhu	hongboz@uvic.ca	ELW B225, (778)922 1616

Optional Text
Cleghorn W. L and Dechev N., 2015, "*Mechanics of Machines*" Oxford University Press.
Erdman. A, Sandor. G, and Kota. S, "*Mechanism Design - Analysis and Synthesis, Vol. 1*", 4th edition, Prentice-Hall.
Lecture notes: Firmani. F, "Theory of Mechanisms".

Learning Outcomes next page

COURSE OBJECTIVES:

- Be able to analyze the dynamics of various mechanisms

LEARNING OUTCOMES: At the end of this course, students will be able to:

Types of Mechanism. Analysis of the kinematics of closed loop linkages using graphical, vector and complex number methods. Follower motion synthesis and the design of cam profile. Gear terminology and the analysis of gear trains. Analysis of static and dynamic loading of mechanism and flywheel design. Introduction to linkage synthesis, spatial and open loop mechanisms, with applications to manipulators.

Weight & Date(s) of Assessments:	**Weight**	**Date**
Assignments:	10 %	Jan 27, Feb 17, Mar 11, Mar 30
Labs	10 %	Feb 6, Feb 20, Mar 13, Mar 27
Mid-term 1	18 %	Feb 22
Mid-term 2	18 %	Mar 17
Final	44 %	TBA

ASSIGNMENTS (Include Assignment Schedule) (Description & Method of Delivery)

Assignments are to be completed individually, though students are encouraged to collaborate to complete each assignment.
Assignment hardcopy submissions are to be made to the MECH 335 dropbox located beside ELW A144.

Assignment #	**Due (4:30 pm)**
1	January, 27th
2	February, 17th
3	March, 11th
4	March, 30th

LABORATORIES (Description & Method of Delivery)

The laboratory sessions will be used to complete instruction and training on the use of Working Model 2-D S. Not all of the laboratory periods will be used for instructional purposes.
Lab reports are to be completed in teams of 3-4 students. Laboratory hardcopy submissions are to be made to the MECH 335 dropbox located beside ELW A144.

Lab #	**Modules**	**Start**	**Due (4:30 pm)**
1	Windshield Wiper Design	Posted on the Coursespace	February, 5th
2	Transport Mechanism Design	Posted on the Coursespace	February, 19th
3	Steering Mechanism Design	Posted on the Coursespace	March, 11th
4	Cam Design	Posted on the Coursespace	March, 25th

PROJECTS: N/A

NOTE:

Failure to complete and submit all assignments and quizzes will result in a grade of N. 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.

COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course 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.

There will be no supplemental examination for this course.

You must pass the final exam to pass MECH 335.

Syllabus:	Hours
Introduction to Kinematics and Mechanisms Definitions. Terminologies. Links, joins, and actuators. Mobility. Mechanism design.	3
Position and Displacement Analysis Graphical, analytical, and loop-closure based methods. Limit positions and time ratio.	6
Velocity and Acceleration Analysis Instant centers. Angular and relative motions. Velocity and acceleration graphical method (Polygons). Velocity and acceleration analytical method.	6
Static and Dynamic Force Analysis of Mechanisms Mechanical advantage. Superposition. Matrix methods. Virtual work.	6
Cam synthesis Nomenclature. Graphical profile design. Follower curve synthesis. Analytical design. Production.	6
Gears and Gear Trains Fundamental law of gearing, Spur gears and involute profiles. Nonstandard spur, bevel, helical, and work gearing. Production of gears. Gear trains: ordinary gear trains, planetary gear trains, harmonic drives	6
Introduction to Mechanism Synthesis Graphical synthesis of mechanisms for motion, path, and function generation.	1.5
Introduction to Manipulators Kinematic analysis of planar manipulators	1.5

GENERAL INFORMATION

Note 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.

"**Attendance**

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time….

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2015) http://web.uvic.ca/calendar2015-09/FACS/UnIn/UARe/Atte.html

Accommodation of Religious Observance (AC1210)
http://web.uvic.ca/calendar2015-09/GI/GUPo.html

Discrimination and Harassment Policy (GV0205)
http://web.uvic.ca/calendar2015-09/GI/GUPo.html

Faculty of Engineering, University of Victoria
Standards for Professional Behaviour

"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals…."

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.
http://www.uvic.ca/engineering/current/undergrad/index.php#section0-23

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity
http://web.uvic.ca/calendar2015-09/FACS/UnIn/UARe/PoAcI.html