Western University
Department of Mechanical & Materials Engineering

MME 3381a - "Kinematics and Dynamics of Machines"

COURSE OUTLINE – 2017-2018

CALENDAR DESCRIPTION:

Displacement, velocity and acceleration analysis of linkage mechanisms; inertia force analysis of mechanisms; balancing of reciprocating and rotating masses; free and harmonic vibrations of single degree of freedom systems.

COURSE INFORMATION:

Instructor:	Professor Remus Tutunea-Fatan Room SEB 2063A Email: rtutunea@eng.uwo.ca
Lectures:	Tu 9:30 pm – 10:30 pm (HSB 236) W 3:30 pm – 4:30 pm (KB, K 106) Th 9:30 pm – 10:30 pm (HSB 236)
Tutorials:	W 4:30 am – 6:30 pm (SEB 1059)
Labs:	M 8:30 am – 11:30 am (SEB 1028) Tu 1:30 pm – 4:30 pm (SEB 1028) W 8:30 am – 11:30 am (SEB 1028) Th 1:30 pm – 4:30 pm (SEB 1028) F 2:30 pm – 5:30 pm (SEB 1028)

PREREQUISITES:

ES 1022a/b/y, MME 2213a/b, AM 2413 or 2415

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

CONSULTATION HOURS:

By advance notice via email or drop in.

ACCREDITATION UNITS:

Engineering Science = 75%, Engineering Design = 25%

TOPICS:

- Fundamentals of mechanisms and machines
- Techniques in geometric constraint programming
- Planar linkage design
- Graphical position, velocity, and acceleration analysis
- Design and analysis of cam-based mechanisms
- Design and analysis of gear-based mechanisms
- Static and dynamic force analysis of mechanisms
- Dynamic force analysis
- Balancing of rotating and reciprocating machines
- Fundamentals of mechanical vibrations

LEARNING OUTCOMES:

Upon successful completion of this course, students will:

- Understand and assess the functionality of a mechanism
- Select or design a mechanism for a specific purpose
- Analyze the position, velocity and acceleration of a linkage using graphical, analytical and computer-based methods
- Model and analyze a mechanism using motion simulation software
- Use hand calculations, computer simulation, and experiments in designing and analyzing machines
- Verify, compare and interpret differences between the results obtained through different means of analysis
- Evaluate the implications of an incorrect mechanism design
- Understand the fundamental principles of the vibratory motion

CONTACT HOURS:

3 lecture hours, 2 tutorial hours, 0.5 laboratory hours, half course

RECOMMENDED TEXTBOOKS:

Waldron K.J., Kinzel G.L., Agrawal S.K., *Kinematics, Dynamics, and Design of Machinery*, 3rd Edition, Wiley, 2016

Beer F.P., Johnston E.R., Mazurek D.F., *Vector Mechanics for Engineers: Statics and Dynamics*, 11th Edition, McGrawHill, 2016

EVALUATION:

The final course grade will be determined according to the following weighting scheme:

In-class/tutorial quizzes	20%
Project	20%
Laboratory sessions	10%
Final examination (closed book)	50%

Please note that:

- Lab session attendance is mandatory.
- Highest 5 quiz marks will be used to calculate the 20% of the final grade associated with quiz marks.
- No make-up quiz options will be offered.
- While the default assumption is that everyone contributes equally to the team effort (*i.e.*, project and labs) and hence everyone should receive the same mark for the team submission, individual adjustments of the marks are also permitted and they are left at latitude of the instructional team (*i.e.*, course instructor and teaching assistants).
- If a minimum of 50% is not obtained on the term work, the student will not be allowed to write the final examination
- Only non-programmable calculators will be allowed during the final examination.
- If a minimum of 50% is not obtained on the final examination, the student cannot receive a final mark greater than 48%.

Quizzes, projects and laboratories will be carried out according to the following *tentative* schedule:

Evaluation Format	Weight	Effort Type	Assigned	Due
Quiz 1	4%	Individual	Sep. 20th	Sep. 20th
Project	20%	Team	Week of Sep. 27th	Week of Nov. 27th
Quiz 2	4%	Individual	Oct. 4th	Oct. 4th
Quiz 3	4%	Individual	Oct. 18th	Oct. 18th
Quiz 4	4%	Individual	Nov. 1st	Nov. 1st
Quiz 5	4%	Individual	Nov. 15th	Nov. 15th
Lab 1	5%	Team	Week of Nov 20th	Week of Nov 20th
Lab 2	5%	Team	Week of Nov 27th	Week of Nov 27th
Quiz 6	4%	Individual	Nov. 29th	Nov. 29th

UNITS: Metric and US customary.

ENGLISH: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests and examinations for the improper use of English. Additionally, poorly written work with the exception of final examinations may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

CLASSROOM DEMEANOR: The instructor is committed to providing a respectful learning environment for all students involved in this course. This is a collective responsibility of the instructor and students, and therefore students partaking in this course agree to abide by this criterion. This includes arriving at lectures on time, and acting in a professional manner during class.

ATTENDANCE: Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

CHEATING: University policy states that cheating, including plagiarism, is a scholastic offense. The commission of a scholastic offence is attended by academic penalties which might include expulsion from the program. If you are caught cheating, there will be no second warning. (see Scholastic Offence Policy in the Western Calendar.

SSD: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

NOTE: Students who have failed an Engineering course (i.e. < 50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.