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SYLLABUS
MENG 3233: Mechanisms and Dynamics of Machines
(Required Course)
Spring 2025

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Instructor: Dr. Sheldon Wang
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Office Hours: M, W, and F: 10:00 am-11:00 am; T: 1:30 pm-3:30 pm; other days and times by appointment.
Course schedule: The class meets for lecture each week on Mondays, Wednesdays, and Fridays from 11:00 am to 11:50 am.
Location: McCoy 136 (lecture).

CATALOG DESCRIPTION OF COURSE
3 sem. hrs. (3 lecture hrs. per wk.)
Kinematics and dynamic analysis of mechanical devices and machines. Displacement, instantaneous center of zero velocity, velocity and acceleration of linkage, cams, and gear trains. Introduction to synthesis of mechanisms. Design and computer problems.

COURSE PREREQUISITE
MENG 2213

OTHER PREREQUISITES
Basic computer skills, SolidWorks, Matlab, MS Excel, Hand calculator.

REQUIRED TEXTBOOK
Design of Machinery. Robert L. Norton, Fourth Edition, McGraw Hill.

REFERENCE
Essential Mathematical Tools for Engineers, Sheldon Wang, Second Edition, Sentia Publishing
Theory of Machines and Mechanisms, J. Uicker, Jr., G. Pennock, J. Shigley, Oxford.
Kinematic Design of Machines and Mechanisms, H. Eckhardt, McGraw-Hill.
Kinematics and Dynamics of Machines, G.H. Martin, McGraw-Hill.
Additional material will be distributed in the form of handouts.

TOPICS COVERED
1. Kinematics fundamentals and applications (3 hours)
2. Motion Transmission (6 hours)
3. Linkage (5 hours)
4. Instant Center (4 hours)
5. Position, velocity, and acceleration analysis (6 hours)
6. Cam design (6 hours)
7. Gear and gear train (6 hours)
8. Break and clutch (6 hours)

Other selected topics as time permits

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

ABET	Student Outcomes						
Outcome-Related Course Learning Objectives	1	2	3	4	5	6	7
Compute the number of degrees of freedom of a mechanism or linkage.	X					X	
Analytically determine the position of all links in a mechanism as the driver links are displaced.	X					X	
Using relative velocity method, analytically determine the velocity of a point of interest.	X					X	
Using the relative acceleration method, analytically solve for the acceleration of a point of interest.	X					X	
Relate the force, torque, and rotational speed in the design of clutches and brakes.	X					X	
Determine the kinematic properties of gears and planetary gear trains.	X					X	
Identify instant centers and implement velocity triangles and acceleration polygons.	X					X	
1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics.							
2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors.							
3: an ability to communicate effectively with a range of audiences.							
4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.							
5: an ability function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.							
6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.							
7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.							

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT
This course contributes to the engineering science component of the Mechanical Engineering program.

COURSE ORGANIZATION AND ASSESSMENT

Attendance policy, etc.:   The instructor adheres to the policies stated in the *MSU Student Handbook* in regard to class attendance, classroom behavior deemed detrimental to learning by other members of the class, academic dishonesty, and student rights. If you do not have a copy of this handbook, one can be picked up at the Office of Student Services

General Education Statement:
   1) Students in this course must demonstrate competency in basic use of computer word processing and spreadsheets (including computer graphing) through the formal preparation of certain

laboratory experiments. 2) Students in this course will always have their writing checked for grammar and spelling during the grading of all laboratory and homework experiments.

Grading formula for course:

Habitual absenteeism and tardiness are recipes for failure in course works and eventually profession and life.

Three Exams (including the final) – 20 % each	60%
Laboratory (attendance, attitude, participation, lab reports)	20%
Homework	20%

Course grade: If the calculation shown above is between 89.5 and 100, the grade is A; 79.5 to 89.4, B; 69.5 to 79.4, C; etc. Make-up tests. A test that is missed due to an ***excused* absence** may be taken two weeks (4 class periods) from the originally scheduled test date

No absence from a test will be regarded as excused unless the student presents the instructor with a valid written excuse either before or within one week from the date of the missed exam. All groups are expected to report to lab at the start of their lab period, whether or not they are the first to perform.   Students are expected to remain in lab during lab time (to either prepare their lab report for data taking or to perform their lab experiments or to observe others performing lab experiments or to calculate and examine their own lab results). Lab reports may be taken up immediately at the end of the lab or at the start of the next lecture or lab.

Some lab reports will be simply handwritten while some will be required to be written and printed from a computer, including graphs and tables.

Labs cannot be made up.   This is due to the to the instructor's limited amount of available time. The labs are turned in by each individual. You are to turn in the lab with a "title" page and you have to list you name first and then your team mates from your lab group (See handout given in class).

Homework should be turned in on the date according to the assignment sheet. Each homework problem should be numbered with chapter and problem number. Problems should be worked on the front side of the paper only.

Students *with disability must be registered with Disability Support Services before classroom accommodations can be provided.*

Final Exam: Monday, May 12, 2025, 10:30 am – 12:30 pm

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at http://mwsu.edu/campus-carry/rules-policies.