Course Syllabus: Mechanisms and Dynamics of Machines

McCoy College of Science, Mathematics, and Engineering
MENG 3233-201, Spring 2026
MWF 11:00am – 11:50am in McCoy Hall 136

Contact Information

Instructor: Professor Sheldon Wang, Ph.D., P.E., ASME Fellow
Office: McCoy Hall 138
Office hours: T and R: 8:30 am-11:00 am; T and R: 1:30 pm-4:30 pm; other days and times by appointment.
Office phone: (940) 397-4061
Cell Phone: (940) 704-8436
Twitter: None
E-mail: sheldon.wang@msutexas.edu

Course Description

3(3-0)
Prerequisite(s): MENG 2213.
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.

Textbook & Instructional Materials

Theory of Machines and Mechanisms, J. Uicker, Jr., G. Pennock, J. Shigley, Oxford.
Essential Mathematical Tools for Engineers by S. Wang, Sentia Publishing, 2nd, Edition.

Study Hours and Tutoring Assistance

Refer to Tutoring & Academics Support Programs Website (https://msutexas.edu/academics/tasp/tutoring-hours.php)

Student Handbook

Refer to: Student Handbook

Academic Misconduct Policy & Procedures

Academic Dishonesty: Cheating, collusion, and plagiarism (the act of using source material of other persons, either published or unpublished, without following the accepted techniques of crediting, or the submission for credit of work not the individual's to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct. Office of Student Conduct

Moffett Library

Moffett Library provides resources and services to support student's studies and assignments, including books, peer-reviewed journals, databases, and multimedia materials accessible both on campus and remotely. The library offers media equipment checkout, reservable study rooms, and research assistance from librarians to help students effectively find, evaluate, and use information. Get started on this Moffett Library webpage to explore these resources and learn how to best utilize the library.

Grading

Course Grade - List all graded assignments with their point value and or percentage of total grade. Letter Grade Scale indicate the overall points or % to letter grade scale.

Table 1: Detailed allocation of grade points

Assignments	Percentage
Quiz (10 to 20 pts each)	10
Homework (10 to 40 pts each)	20
Discussion	5
Midterm Exam (40 to 80 pts each)	30
Project	5
Final Exam	30
Total Points	100

Table 2: Total points for final grade.

Grade	Percentage
A	90 above
B	80 to 89
C	70 to 79
D	60 to 69
F	Less than 60

Homework

Homework should be turned in on the date according to the assignment requirement.

Quizzes

Quizzes will be assigned in class randomly and fairly frequently.

Mid-Term and Final Exams

Mid-Term exams and final exam will be in-class and open book.

Projects Required

These will appear as stipulated in class with more details.

Extra Credit

Extra credits will be available for classroom participations and extracurricular activities.

Late Work

State whether or not you will accept late work, and any conditions you stipulate.

Make Up Work/Tests

State whether or not you will allow students to make up missed assignments and tests, and any conditions you stipulate.

Important Dates

- Refer to: Academic Calendar (https://msutexas.edu/registrar/calendars.php)

Desire-to-Learn (D2L)

Extensive use of the MSU D2L program is a part of this course. Each student is expected to be familiar with this program as it provides a primary source of communication regarding assignments, examination materials, and general course information. You can log into D2L through the MSU Homepage. If you experience difficulties, please contact the technicians listed for the program or contact your instructor.

Attendance

Students are expected to attend all meetings of the classes in which they are enrolled. Although in general students are graded on intellectual effort and

performance rather than attendance, absences may lower the student's grade where class attendance and class participation are deemed essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should so inform students of the specifics in writing at the beginning of the semester in a syllabus or separate attendance policy statement. An instructor who has an attendance policy must keep records on a daily basis. The instructor must give the student a verbal or written warning prior to being dropped from the class. Instructor's records will stand as evidence of absences. A student with excessive absences may be dropped from a course by the instructor. Any individual faculty member or college has the authority to establish an attendance policy, providing the policy is in accordance with the General University Policies.

Online Computer Requirements

Taking an online class requires you to have access to a computer (with Internet access) to complete and upload your assignments. It is your responsibility to have (or have access to) a working computer in this class. ***Assignments and tests are due by the due date, and personal computer technical difficulties will not be considered reason for the instructor to allow students extra time to submit assignments, tests, or discussion postings.*** Computers are available on campus in various areas of the buildings as well as the Academic Success Center. ***Your computer being down is not an excuse for missing a deadline!!** There are many places to access your class! Our online classes can be accessed from any computer in the world which is connected to the internet. Contact your instructor immediately upon having computer trouble If you have technical difficulties in the course, there is also a student helpdesk available to you. The college cannot work directly on student computers due to both liability and resource limitations however they are able to help you get connected to our online services. For help, log into D2L**.**

Instructor Class Policies

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

Change of Schedule

A student dropping a course (but not withdrawing from the University) within the first 12 class days of a regular semester or the first four class days of a summer semester is eligible for a100% refund of applicable tuition and fees. Dates are published in the Schedule of Classes each semester.

Refund and Repayment Policy

A student who withdraws or is administratively withdrawn from Midwestern State University (MSU) may be eligible to receive a refund for all or a portion of the

tuition, fees and room/board charges that were paid to MSU for the semester. HOWEVER, if the student received financial aid (federal/state/institutional grants, loans and/or scholarships), all or a portion of the refund may be returned to the financial aid programs. As described below, two formulas (federal and state) exists in determining the amount of the refund. (Examples of each refund calculation will be made available upon request).

Services for Students with Disabilities

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Midwestern State University endeavors to make reasonable accommodations to ensure equal opportunity for qualified persons with disabilities to participate in all educational, social, and recreational programs and activities. After notification of acceptance, students requiring accommodations should make application for such assistance through Disability Support Services, located in the Student Wellness Center, (940) 397-4140. Current documentation of a disability will be required in order to provide appropriate services, and each request will be individually reviewed. For more details, please go to Disability Support Services.

College Policies

Campus Carry Rules/Policies

Refer to: Campus Carry Rules and Policies

Smoking/Tobacco Policy

College policy strictly prohibits the use of tobacco products in any building owned or operated by WATC. Adult students may smoke only in the outside designated-smoking areas at each location.

Alcohol and Drug Policy

To comply with the Drug Free Schools and Communities Act of 1989 and subsequent amendments, students and employees of Midwestern State are informed that strictly enforced policies are in place which prohibits the unlawful possession, use or distribution of any illicit drugs, including alcohol, on university property or as part of any university-sponsored activity. Students and employees are also subject to all applicable legal sanctions under local, state and federal law for any offenses involving illicit drugs on University property or at University-sponsored activities.

Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes has prohibited. The new

Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit Campus Carry.

Active Shooter

The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit MSUReady – Active Shooter. Students are encouraged to watch the video entitled "*Run. Hide. Fight.*" which may be electronically accessed via the University police department's webpage: *"Run. Hide. Fight."*

Grade Appeal Process

Update as needed. Students who wish to appeal a grade should consult the Midwestern State University MSU Catalog

*__Notice:__ Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor.

Course Schedule:

Please note the disclaimer above and include that with your schedule. There can be no blanks in your table. You must put some kind of text in all the blanks such as: N/A or No content. (Use the same color text as background if you want to keep it uncluttered for your sighted learners). Tables must not extend to another page (cannot be wider than the page). If it is going to extend to next page, you will need to create another table with heading. You can use a dash (-) or "to" between dates, avoid using the @ sign unless in web address.

Week or Module	Activities/Assignments/Exams	Due Date
Week 1 1/21 to 1/26	Kinematics fundamentals and applications	As Posted on D2L and the Course Plan
Week 2 to 3 1/28 to 2/2	Motion transmission, mass point, and rigid body (link)	As Posted on D2L and the Course Plan
Week 4 to 5 2/4 to 2/23	Crank-slider mechanism and four-bar linkage, instant center	As Posted on D2L and the Course Plan
Week 6 to 7 2/25 to 3/8	Position, velocity vector, and acceleration polygon	As Posted on D2L and the Course Plan
Week 9 to 10 3/15 to 3/26	Cam design, flat-top, concentric, and eccentric, undercut	As Posted on D2L and the Course Plan
Week 11 to 12 3/29 to 4/9	Spur gear, gear trains, contact ratio, diametral pitch, module	As Posted on D2L and the Course Plan

Week or Module	Activities/Assignments/Exams	Due Date
Week 13 to 16 4/12 to 5/7	Belts, Clutches, short-shoe brakes, and long-shoe brakes	As Posted on D2L and the Course Plan

***Important note:** Tables are already set up for compliance. If you wish to add another table, make sure do the correct compliance setup for tables which you can find in the How To – Word Doc ADA Compliance PDF.

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT

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.

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.