

MECH 3350.501.16F Course Syllabus

MECH 3350.001.16F – Kinematics and Dynamics of Mechanical Systems

MW 5:30-6:45 Aug 22 – Dec 7, 2016

JO 4.614

Professor Contact Information

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Off: ECSN 2.504

Ext 4681

office hours: TBD

TA TBD

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisite(s):

ENGR 2300 – Linear Algebra for Engineers

MATH 2420 – Differential Equations with Applications

MECH 2330 – Dynamics

ENGR 3300 – Advanced Engineering Mathematics

Co-requisite(s): None

Course Description

Lecture course. Motion and interaction of machine elements and mechanisms. Kinematics, statics, and dynamics are applied for analysis and design machines and machine components such as planar mechanisms, cams and gears.

Student Learning Objectives/Outcomes

1. Students will be able to compute the position, velocity and acceleration in mechanisms.
 2. Students will be able to obtain the static and dynamic forces and torques in mechanisms.
 3. Students will be able to quantify the requirements, constraints and trade-offs in the selection and design of select mechanism components such as cams and gears.
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Required Textbooks and Materials

Theory of Machines and Mechanisms, 4th Ed.

by John J. Uicker, Gordon R. Pennock and Joseph E. Shigley

ISBN-13: 978-0195371239

Suggested Course Materials

Student's edition of Matlab / Simulink

Topics:

(topics and times are approximate and subject to change at the instructors discretion)

- I. Kinematics of Mechanisms:
 - a. Definitions / Degrees-of-Freedom / Mech. advantage (chap 1)
 - b. Geometry / displacement analysis (chap 2)

- c. Velocity analysis / instant centers / Kinematic Coefficients (chap 3)
- d. Acceleration analysis (chap 4)
- e. Specified motion profiles & Intro to Euler matrices (select sections)
- II. Dynamics - Torques / Forces in Mechanisms:
 - a. Newton's Laws / friction / Equil & static analysis (chap 13)
 - b. Review of Mass Properties / the Inertia Tensor (chap 14)
 - c. Dynamic force / torque analysis & Equations-of-Motion (chap 14)
 - d. Power & Work relations (chap 14)
 - e. Static & dynamic unbalance effects (chap17)
 - f. Gyroscopic & other distinct forces / torques (select sections & supp mat'l)
- III. Analysis of select mechanism components & mechanism trains
 - a. Spur & planetary gears & gear trains (chaps 7 & 9)
 - b. Belt and screw mechanisms (supp material)
 - c. Systems Equations-of-Motion (EOM)
 - d. Introduction to vibration (chap 15)

Tentative Exam Schedule:

Midterm: Oct 10 (tentative)

Final (comprehensive): TBD per university schedule

Grading Policy:

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|--------------------------------|------|
| Homework / special assignments | 25% |
| Midterm exam | 35% |
| Final exam | 40% |
| Overall Score | 100% |

Grading Goals (note: +/- may be assigned within these brackets):

- A 91-100
- B 81-90
- C 71-80
- D 61-70
- F < 61

Course & Instructor General Policies

Hard copy homework is due at the beginning of the class period on the scheduled due date. Late homework will not be accepted without the consent of the instructor or TA prior to the due date and will not be accepted except for unusual circumstances (Note: discounted grades may apply). All questions related to homework should be addressed to your class TA.

Unless specifically stated on a given assignment, working together with other students on out-of-class assignments is acceptable but each student is responsible for all work submitted. Copying of other students work or from other sources is prohibited and subject to disciplinary action.

Students are expected to attend lectures, read the text and other assigned material such as supplementary material posted on eLearning. Students are responsible for all reading assignments as well as all material presented in the lectures. Makeup exams will only be given in cases of verified emergencies.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus: <http://go.utdallas.edu/syllabus-policies> .

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.