Spring
2025

SCUPI
Sichuan University - Pittsburgh Institute

ENGR 0135 Statics and Mechanics of Materials I

Instructor: Dr. Ruiqi DONG

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Office Hours: Monday and Tuesday 9:00AM~12:00AM, S522
Any other days - by appointment only

Class Logistics: Tuesday 13:50-16:25 PM, SCUPI new building 208

Catalog Description: This course is a 3-credit hour class that will cover two major subjects in Mechanical Engineering i.e.: Statics and Mechanics of Materials. For statics, the course will discuss about forces in plane and space, equilibrium of particles and equilibrium of rigid body and analysis of structure for truss problem. For Mechanics of Materials, the concept of stress, the axial load, torsion load, bending load and combine load will be covered. Finally, the mechanical design of a system will also be discussed to help students to develop the logical thinking in handling the real problem in mechanics.

Course Objective

- To introduce the theory and concepts of equilibrium of force systems and equivalent of force/moment systems.
- To introduce the theory and concepts that describe the behavior of deformable bodies when subject to forces.
- To introduce fundamental concepts of material properties.
- To enable implementation of these ideas for analysis of structures.
- To apply this knowledge to design new structures.

Course contributes to the following ABET Criterion 3 outcomes:

1) an ability to identify, formulate, and solve complex engineering problems by applying 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.

6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Prerequisites: MATH 0230 Analytic Geometry & Calculus 2
PHYS 0174 Basic Physics for Science & Engr. 1

Textbook: W. F. Riley, L. D. Sturges, and D. H. Morris: Statics and Mechanics of Materials: An Integrated Approach. 2nd Edition. John Wiley & Sons, Inc.

Reference: R. C. Hibbeler Engineering Mechanics: Statics. Pearson Prentice-Hall.
J. M. Gere and B. J. Goodno Mechanics of Materials. Cengage Learning.

Topics Covered:

1. Newton's Laws of Motion
2. Concurrent Force Systems and Equilibrium Equation
3. Stress, Strain and Deformation of Material
4. Stress-Strain Diagram and Hooke's Law
5. Moments and Equivalent System
6. Centroid and Center of Mass
7. Equilibrium of Rigid Body in 2D and 3D
8. Truss – Method of Joint and Sections
9. Torsion and Shaft

Grades:

Homework	10%
In-class quiz	20%
Mid-term exam	30%
Final exam	40%

While grades may be curved, there is no guarantee of any curve. However, in order to receive a grade of D or better and to be eligible to take Make-Up exam, a student will have to reach 50 % of the total possible points. If any student fails this course and takes Make-Up exam, the highest grade that student can receive is D.

Homework, Reading Assignment, In- Class Quiz and Exams:

There will be homework problems assigned on weekly base, which will be graded as 10% of your grade. I strongly encourage for students to **work on homework on their own** since doing homework independently will reinforce and extend the knowledge of the material learned in class. Students are also encouraged to work with your classmates. Should you have any trouble with the homework, ask TA and instructors for help during designated office hours.

Students are expected to **read textbook before and after** each class period following the lecture schedule, which is the reading assignment. Remember lectures will be given assuming students read textbook before class.

In-Class Quiz will be given periodically during class hours, and there is **NO make-up** for quiz if you are absent from the class. You will work on and complete these problems as an individual within given time.

All the In-Class Quiz and homework should be submitted on BB. **If answer(s) is(are) required to submit to BB, the answer(s) of the question(s) must be handwritten otherwise NO credit will be given for that work**.

There will be **one mid-term exam** and **one final exam**. The final exam is comprehensive. The exams in this course will be closed book and closed note.

If you miss any exam, NO make-up will be given for the missing exam without prior arrangement. If you have a serious conflict with an exam time, you MUST discuss it with the INSTRUCTOR well ahead of the scheduled exam day to make an appropriate arrangement. Exams missed due to unpredictable events such as a family emergency and a traffic accident will be dealt with on a case-by-case basis if the student has a proper document(s) to prove it.

Students have 1 day after the any graded work including exams is returned and/or the grad of a work is posted on BB to dispute the grade.

Collaboration:

Collaboration between students is strongly encouraged for better understanding of the course material. Students are allowed to discuss homework problems and projects in terms of **methodologies**, but **not the solutions** of a problem, which means that each student MUST do the actual work independently. Inappropriate collaboration (also known as cheating) includes

- Using all or parts of homework, exams or projects from this year or any previous year
- Sharing of work such as graphs, equations, calculations, or any other derived material that was not presented to the class
- Talking, passing information, or using inappropriate materials during an exam Anyone found to be participating in inappropriate collaboration may be immediately failed from the course.

Office Hours:

Office hours are times I have specifically set aside to be available to students. During office hours, you can come to my office; you don't need an appointment. I may be available at other times; please email to schedule a time, or simply drop by, outside these times.

Attendance:

On- time attendance at all class activities is expected. Attendance itself will not be graded, but the student is responsible for any material that was covered, and any changes to the exam dates and homework assignments announced in class. Make- up work will only be accepted if prior arrangement has been made or if a valid emergency excuse (e.g., meteor strike) is accompanied by appropriate documentation.

Other Policies:

Please honor the following: do not come late; do not disturb the class by having conversation with others; do not work on any class materials other than Statics and Mechanics of Materials I.

Those students who fail to follow these policies may be asked to leave the class.

The instructor also reserves the right to extend credit for alternative assignments, projects, or presentations and to make changes to this syllabus as needed.

All changes will be announced via Blackboard and/or announced in class.

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Class Week	Chapter	Topic
1	Ch. 1.1 ~ 1.6	Introduction, Basic Concepts, Newton 's Law Units, Dimensions, Significant Figures
2	Ch. 2.1 ~ Ch. 2.7	Force Vector and Concurrent Force Systems
3	Ch. 3.1 ~ Ch. 3.4	Equilibrium of Concurrent Force Systems
4	Ch. 4.1 ~ Ch. 4.5	Stress and Strain under Axial Loading Stress-Strain Diagram and Hooke's Law
5	Ch. 4.1 ~ Ch. 4.5	Stress and Strain under Axial Loading Stress-Strain Diagram and Hooke's Law
6	Ch. 4.6 ~ Ch. 4.11	Thermal Effect Deformation under Axial Loading
7	Ch. 5.1 ~ Ch. 5.6	Moments and Equivalent Systems
8	Ch. 5.7 ~ Ch. 5.11	Centroids, Center of Mass, and Distributed Loads
9	Review	**Mid-Term Exam**
10	Ch. 6.1 ~ Ch. 6.3	Equilibrium of Rigid and Deformable Bodies
11	Ch. 6.4 ~ Ch. 6.5	Frame & Machines Statically Indeterminate Problems
12	Ch. 6.6	Plane Truss
13	Ch. 6.7 ~ Ch. 6.8	Equilibrium in 3D and Friction
14	Ch. 7.1 ~ Ch. 7.4	Torsion I
15	Ch. 7.5 ~ Ch. 7.8	Torsion II
16	Review	Ch.2 ~ Ch. 7
17	**Final Exam**	