Fall
2018

SCUPI
Sichuan University - Pittsburgh Institute

ENGR 0135 Statics and Mechanics of Materials I

Instructor: Jangho Yoon, Ph.D.
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Office hours: Tue, Wed:12:30 ~ 13:30 PM, Thu: 16:00 ~ 17:00 PM or by appointment
Class time: Mon: 13:50 ~ 16:25 PM, Wed: 15:40 ~ 18:25 PM
Thu: 09:10 ~ 11:55 AM, Thu: 18:00 ~ 20:35 PM
Class location: Liberal Art Building Zone 3 Room #104

Catalog Description:

This course is a 3 credit hours 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

The aim of this course is:

- 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.

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

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Week	Chapter	Topic
1	Ch. 1.1 & Ch. 1.5	Introduction, Basic Concepts, Newton's Law
2	Ch. 1.2 ~ Ch. 1.4	Units, Dimensions and Significant Figures
3	Ch. 2.1 ~ Ch. 2.7	Force Vector and Concurrent Force Systems
4	Ch. 3.1 ~ Ch. 3.4	Equilibrium of Concurrent Force Systems
5	**No Class (National Holiday)**	
6	Ch. 4.1 ~ Ch. 4.5	Stress and Strain under Axial Loading Stress-Strain Diagram and Hooke's Law
7	Ch. 4.6 ~ Ch. 4.11	Thermal Effect Deformation under Axial Loading
8	Ch. 5.1 ~ Ch. 5.6	Moments and Equivalent Systems
9	**Exam I**	
10	Ch. 5.7 ~ Ch. 5.11	Centroids, Center of Mass, and Distributed Loads
11	Ch. 6.1 ~ Ch. 6.3	Equilibrium of Rigid and Deformable Bodies
12	Ch. 6.4 ~ Ch. 6.5	Frame &Machines Statically Indeterminate Problems
13	Ch. 6.6	Plane Truss
14	Ch. 6.7 ~ Ch. 6.8	Equilibrium in 3D and Friction
15	Ch. 7.1 ~ Ch. 7.4	Torsion I
16	Ch. 7.5 ~ Ch. 7.8	Torsion II
17	**Review and Exam II**	
18	**Final Exam**	

Grades

Weekly Homework	0 %
In-Class Work	20 %
Two Term Exams	30 % (15 % each, Nov 1 and Dec 20)
One Final exam	50 % (Final Week)

While grades may be curved, there is no guarantee of any curve. However, in order to receive a grade of D^- or better, a student will have to reach 50 % of the total number of possible points. In the absence of a curve the grading scale is

$$A > 90\% \qquad A^- > 85\%$$
$$B^+ > 80\% \qquad B > 76\% \qquad B^- > 73\%$$
$$C^+ > 70\% \qquad C > 66\% \qquad C^- > 63\%$$
$$D^+ > 61\% \qquad D = 60\% \qquad F < 60\%$$

Any questions regarding the grading discrepancy should be brought up within a week of returning the graded work of any kind.

Homework, In-Class Work and Exams

There will be homework assigned on weekly base even though it will NOT be collected and graded. Students are strongly encouraged to work on them since it will reinforce and extend the knowledge of the material learned in class. As a result, failure to do so may affect students' understanding of the material.

In each class, you will be assigned a number of problems to help you practice and learn the material. You will work on and complete these problems as a team or as an individual during the class period. This will be collected and graded.

There will be **two term exams** and **a final exam**. The final exam will be comprehensive. The exams in this course will be closed book and closed note. Students will be given a formula sheet containing all the necessary formula.

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 and take the exam early. Exams missed due to a serious illness or a family emergency (these must be documented) will be dealt with on a case-by-case basis. In principle, the grade on relevant questions of the final exam will count towards the missed midterm for these documented absences.

Units and Significant Figures

It is important that you show the work in an organized manner clearly showing your thought process in solving the assigned problem **with appropriate units**. If necessary, staple pages of your work together and do not write on the back of paper.

For homework, project and exam you will be penalized for any missed unit or wrong unit, and also be penalized for using an excessive number of significant figures.

e.g., $\pi = 3.1415926535897932385$ instead of $\pi = 3.14$

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 (I usually will be in my office during the day Monday through Thursday).

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 conservation with others; turn off all cell phones and electronic gadgets.

The instructor also reserves the right to extend credit for alternative assignments, projects, or presentations.

The instructor reserves the right to make changes to this syllabus as needed. All changes will be announced via Blackboard and/or announced in class.