Fall
2022

SCUPI
Sichuan University - Pittsburgh Institute

ENGR 0135 Statics and Mechanics of Materials I

Instructor: Jangho Yoon, Ph.D.
Office: Liberal Art Building Zone 4 Room # 218
E-mail: janghoyoon@scupi.cn

Office hours: Tue & Wed: 17:00 ~ 18:00 PM and Thu: 14:00 ~ 15:00 or by appointment

Class Logistics: Tue: 13:50 ~ 16:25 PM, Teaching Building 1 C103
Wed: 13:50 ~ 16:25 PM, Teaching Building 1 D302
Thu: 15:40 ~ 18:25 PM, Liberal Art Building Zone 3 Room # 101

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

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

Grades

In-Class Work	5%
Review Quiz	10 %
Two Term Exams	45 % (tentatively scheduled on Oct 21 and Dec 9)
One Final exam	40 % (Scheduled on TBA)

While grades may be curved, there is no guarantee of any curve. However, 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

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

Homework, Reading Assignment, In-Class Work and Exams

There will be homework problems assigned on weekly base, which will not be graded since homework is not a part of your grade. However, 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 each class, there will be the pre-class work and the post-class work. The pre-class work will be given at the beginning of each class period and consists of a few questions designed to evaluate the reading assignment. The post-class work will be given at/near the of each class period and is to help you practice the learned material. You will work on and complete these problems as an individual within given time.

Review Quiz will be given periodically during outside of class hours.

All the In-Class Works and Review Quiz will be given 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 **two term exams** and **one final exam**. The final exam is 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 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 one week after the any graded work of any kind including exams is returned or the grade is posted on BB to bring up any questions regarding the grading discrepancy.

It is important that you show the work in an organized manner clearly showing your thought process in solving the given question. Instructor cannot give points for the answer(s) that is(are) not readable and/or understandable. For homework, always staple pages together and do not write on the back of paper.

Make sure that you use appropriate units for all your work such as homework, project, and exam, or you will **be penalized** for any missed unit or wrong unit, and also be **penalized** for using 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.

Be prepared to show me what work you have done and try not to ask vague questions

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; do not work on any class materials other than Statics and Mechanics of Materials I.

Those students who faile 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.

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.

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Class Week	Chapter	Topic
2	Ch. 1.1 ~ 1.6	Introduction, Basic Concepts, Newton's Law Units, Dimensions, 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	Ch. 4.1 ~ Ch. 4.5	Stress and Strain under Axial Loading Stress-Strain Diagram and Hooke's Law
6	**No Class（国庆节)**	
7	Ch. 4.6 ~ Ch. 4.11	Thermal Effect Deformation under Axial Loading
8	**Exam I – Oct 21**	
9	Ch. 5.1 ~ Ch. 5.6	Moments and Equivalent Systems
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	**Exam II – Dec 9**	
16	Ch. 7.1 ~ Ch. 7.4	Torsion I
17	Ch. 7.5 ~ Ch. 7.8	Torsion II
18	**Final Exam**	