SCUPI
Sichuan University - Pittsburgh Institute

2021S-MSE_1070 MECHANICAL BEHAVIOR OF MATERIALS

Course Syllabus **Spring 2021**

Description

The mechanical behaviour of a material reflects the relationship between its response (deformation) to an applied load (or force) such as strength, ductility, hardness, stiffness, and toughness. These are known as mechanical properties. These properties play a vital role in the analysis and development of structures, machines and engineering and commercial products. These components are subjected to natural or applied loads under varying conditions of temperature and environment. Determination of mechanical properties through various tests is of utmost importance to design engineers. There are two types of tests: destructive and non-destructive. This course explains with focus on destructive test, in which the material is subjected to loads or moments for the ultimate failure of the material. Many components are subjected to stress reversals and time-dependent strain, so in this course properties of fatigue and creep will also be. We will also illustrate the dislocations concepts, plastic deformation, strengthening mechanisms and fracture. Moreover, the role of materials and metallurgical engineers is to produce and fabricate materials to meet service requirements as predicted by stress analysis.

Course content

1. Introduction on Mechanical Behavior of Materials and its Importance
2. Mechanical Testing of Materials
3. Introduction to Dislocations
4. Plastic Deformation
5. Strengthening Mechanisms
6. Time Dependent Deformation – Creep
7. Cyclic Stress – Fatigue.
8. Fracture
9. Mechanical behavior of polymer, ceramics and composites

Instructor:

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Textbook

- Mechanical Properties of Materials, Joshua Pelleg, Springer, 2013, ISBN 978-94-007-4342-7 (eBook).
- Lecture Notes

Web Site

This course uses the Blackboard system; the web site is

https://learn.scupi.cn/

Class Format

Lecture based. Lecturer may ask questions to as many students as possible to encourage them for critical thinking.

Homework Assignments

All of the homework scores will be used in your grade computation. Unless otherwise indicated, you can work with your fellow classmates in the class, but you must submit a distinct and independent write-up to receive credit.

Grading

Homework (20%), class participation (10%), Class Presentation (20%) and final examination (50%).