COURSE DETAIL

INTRODUCTION TO MATERIALS SCIENCE
Country Singapore
Host Institution Singapore University of Technology and Design
Program(s) Singapore University of Technology and Design
UCEAP Course Level Upper Division
UCEAP Subject Area(s) Materials Science
UCEAP Course Number 105
UCEAP Course Suffix
UCEAP Official Title INTRODUCTION TO MATERIALS SCIENCE
UCEAP Transcript Title INTRO MATERIALS SCI
UCEAP Quarter Units 6.00
UCEAP Semester Units 4.00

Course Description

This course explores the fundamentals of structure and energetics that underpin materials science. An appreciation of structure underlies nearly every design and application of materials to a greater or lesser extent and many fascinating materials phenomena. The course discusses how to describe the structure of crystalline and non-crystalline states, and the various (e.g., point, line, and surface) imperfections in materials. The course also discusses how to determine the structure using diffraction techniques. The subject matter of this course can be applied to many real-world examples such as materials for fuel cells and batteries, engineered alloys, electronic and magnetic materials, polymers, and biomaterials. The course examines topics including: materials structure, how it is influenced by the interatomic bonding and processing parameters, and how materials properties are determined by the structure; metals, ceramics, polymers, and composites; how to describe the structure of materials using structural descriptors and understanding the difference between gasses, liquids, amorphous, and crystalline solids; defects in crystalline materials: point defects in solids, line defects, slip planes, and dislocations; equilibrium phase diagrams; electronic, mechanical, magnetic, and optical properties of materials; and the structure-processing-properties relationship and the life-cycle assessment for selection of materials and development of sustainable materials in the design of parts, structures, and products.

Language(s) of Instruction
English

Host Institution Course Number
30.108

Host Institution Course Title
INTRODUCTION TO MATERIALS SCIENCE

Host Institution Course Details
https://epd.sutd.edu.sg/undergraduate-courses/30108-material-science/

Host Institution Campus

Host Institution Faculty
Host Institution Degree
Host Institution Department Engineering Product Development
Course Last Reviewed 2023-2024

Print