

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 Campus

Host Institution Faculty

Host Institution Degree

Host Institution Department
Engineering Product Development

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