

SCME 202 Basic Principle of Ceramics
Second Semester Academic Year 2024-2025
Faculty of Science, Mahidol University

Student Groups **Materials Science and Nano Engineering**
Class Schedule *Tuesday at 9:30-12:20 (lecture)*
Instructors *Prof. Dr. Nisanart Traiphol (Nisanart.t@chula.ac.th)*

Course Description

Covalent and ionic characters, structural properties of ceramics, synthesis and processing, mechanical-, electronic-, magnetic- and optical-properties of ceramics.

Grading Policy

Student evaluation is in accordance with the rules and regulations of the Faculty of Science, Mahidol University. Letter grades of A, B+, B, C+, C, D+, D, and F will be given according to the student's score.

For Lecture (100%):

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|--------------------------|-----|
| Attendance/Participation | 10% |
| Assignments | 20% |
| Midterm Exam | 35% |
| Final Exam | 35% |

Textbooks

Recommended

1. Introduction to Ceramics, 2nd Edition by W. D. Kingery, H. K. Bowen, D. R. Uhlmann
2. Fundamentals of Ceramics by M. W. Barsoum

Course Timetable

| Date | Topics | Instructor |
|----------------|---|-------------------|
| Jan 7, 2025 | Introduction: Definition of ceramics, crystalline versus amorphous solids, traditional versus advanced ceramics | Nisanart |
| Jan 14, 2025 | Bonding in ceramics: structure of atoms, ionic bonding, covalent bonding | Nisanart |
| Jan 21, 2025 | Band theory of solids | Nisanart |
| Jan 28, 2025 | Ceramic structures: Ionic ceramics, covalent ceramics, silicates | Nisanart |
| Feb 4, 2025 | Defects in Ceramics: Point defects | Nisanart |
| Feb 11, 2025 | Defects in Ceramics: Line defects, planar defects | Nisanart |
| Feb 18, 2025 | Glasses: structure | Nisanart |
| Feb 25, 2025 | Glasses: formation, properties | Nisanart |
| | Midterm Examination | |
| Mar 11, 2025 | Sintering: solid-state sintering, liquid phase sintering | Nisanart |
| Mar 18, 2025 | Mechanical properties: stress, strain, fracture toughness, strength, creep | Nisanart |
| Mar 25, 2025 | Electrical properties: Dielectricity, capacitors | Nisanart |
| April 1, 2025 | Electrical properties: piezoelectricity, ferroelectricity | Nisanart |
| April 8, 2025 | Magnetic properties: basic theory, Type of magnetism, hysteresis behavior | Nisanart |
| April 22, 2025 | Optical properties: basic principles, absorption, transmission, scattering | Nisanart |
| | Final examination | |