ESG 332 MATERIALS SCIENCE I: STRUCTURE & PROPERTIES OF MATERIALS (REQUIRED)

Credit: 3

COURSE CATALOG DESCRIPTION:
A study of the relationship between the structure and properties of engineering materials and the principles by which materials' properties are controlled. The structure and the structural imperfections in simple crystalline materials and the role that these factors play in defining electrical conductivity, chemical reactivity, and mechanical strength/ductility are considered. The molecular structure of polymers is discussed and related to the behavior of plastics, rubber, and synthetic fibers. The principles of phase equilibria and phase transformations in multi-component systems are developed. These principles are applied to the control of the properties of semi-conductors, commercial plastics, and engineering alloys by thermochemical or thermomechanical treatment. Corrosion, oxidation, and other deterioration processes are interpreted through the interaction of materials with their environment.

PRE- OR CO-REQUISITE(S): ESG 198 or CHE 131 or 141 and ESG 302

TEXT(S) OR OTHER REQUIRED MATERIAL William D. Callister, Jr., Materials Science and Engineering: An Introduction, 10th Global Edition, 2020, Wiley, ISBN# 978-1-119-45391-8

COURSE LEARNING OUTCOMES	SOs	ASSESSMENT TOOLS
Knowledge of underlying atomic and crystal structures of materials	(1),(4),(7)	Written examinations
Knowledge of influence of atomic and crystal structures upon materials properties	(1),(4),(7)	Written examinations
Understanding of how materials are designed to meet performance criteria	(1),(2),(4),(7)	Written examinations

COURSE TOPICS:

Week 1. Introduction & Atomic Structure and Interatomic Bonding
Week 2. The Structure of Crystalline Solids
Week 3. Imperfections in Solids and Diffusion
Week 4. Mechanical Properties of Metals
Week 5. Dislocations and Strengthening Mechanisms & Failure
Week 6. Phase Diagrams
Week 7. Phase Transformations
Week 8. Mid-term Exam & Applications and Processing of Metal Alloys
Week 9. Applications and Processing of Metal Alloys (cont'd)
Week 10. Structures and Properties of & Applications and Processing of Ceramics
Week 11. Polymer Structures & Characteristics, Applications, and Processing of Polymers
Week 12. Composites
Week 13. Electrical Properties (incl. Semiconductivity)
Week 14. Corrosion and Degradation of Materials & Environmental and Societal Issues in MSE
Week 15. Final exam

CLASS/ LABORATORY SCHEDULE:

ESG	332	Materials Sci I: Struct & Prop					
		Lectures	LEC	1	TUTH	10:30 AM	11:50 AM
		Recitation	REC	R01	TU	09:30 AM	10:25 AM
		Mid-term exam	Exam	1	Oct. 20	10:30 AM	12:00 NN
		Final exam	Exam	1	Dec. 13	10:00 AM	11:30 AM

CURRICULUM

This course contributes 3 credit hours toward meeting the required 48 hours of engineering subjects.

STUDENT OUTCOMES (SCALE 1-3):

(1)	(2)	(1)	(4)	(5)	(6)	(7)
3	2		2			3

3 – Strongly supported **2 – Supported** **1 – Minimally supported**

LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:

Clive Clayton 05/17/10 at Stony Brook University, NY, USA.

Revised (07/22/22) at SUNY Korea by Ohyang Kwon, Instructor

OFFICE HOURS

Tuesday, 12:00-2:00 PM (B618 Academic Building) or by Appointment

GRADING POLICY (ASSESSMENT RUBRICS)

Mid-term Exam (Thursday, Oct. 20, 2022) – 35%
Final Exam (Tuesday, Dec. 13, 2022) – 35%
Quizzes (for twice, 5% each) – 10%
Assignments (Homework) – 10%
Attendance – 10%

- *Note that the quiz shall be given in the in-person class only. In case it is impossible to have a quiz, the credit of 5% for each quiz will be added to the Mid-term exam and/or the Final exam.*

General Policies:

- Homework and their solutions will be posted (mainly on weekly basis) on the Blackboard. Original students' solutions will be held by the department. Students can view their graded work upon request.
- The Blackboard can be accessed at https://blackboard.stonybrook.edu/.
- The exact time and details about the exams will be announced in the class (and also posted on the Blackboard).

- It is the responsibility of students to make sure that they can access the Blackboard and they have a working email registered with it. The Blackboard should be checked frequently for new materials.
- Exams will be closed-book. Each person should have a calculator for the required computations.

Attendance Policy of SUNY Korea:

1. All students of SUNY Korea are required to attend every class.
2. Unexcused absences will affect seriously the student's final grade in the course.
3. If a student has over 20% unexcused absence, the student's final course grade will be an 'F'.

(Example)

- If the class is a 160-minute class, and is held once a week, the 4th unexcused absence of a student will lead to an F grade of the course.
- If the class is a 80-minute class, and is held twice a week, the 7th unexcused absence of a student will lead to an F grade of the course.
- If the class is a 53-minute class, and is held three times a week, the 10th unexcused absence of a student will lead to an F grade of the course.
- In Intensive English Course (IEC), if a student misses the class more than 40 hours in a semester, the student will receive an F grade on the course.

4. Students should report the reason of absence to the instructor in advance, or immediately after the absence.
5. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
6. The instructor of the course reserves the right to excuse absences.
7. The course instructor may excuse the absence if the submitted documentation fulfills the conditions below.
   - Extreme emergencies (e.g. death in the family)
   - Severe medical reasons with doctor's note (Not a slight illness)
   - Very important events (e.g. national conference, official school event)

At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Calculator Policy (following NCEES Policy)

The only calculator models acceptable for use during the 2022 exams and quizzes are as follows.

Casio: All fx-115 and fx-991 models (Any calculator must have "fx-115" or "fx-991" in its model name.)
Hewlett Packard: The HP 33s and HP 35s models, but no others.
Texas Instruments: All TI-30X and TI-36X models (Any TI calculator of model "TI-30X" or "TI-36X")

Disability Support Services (DSS):
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website:
http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management Statement:
The State University of New York, Korea expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.