

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



MASTER SYLLABUS

**COURSE NUMBER – COURSE NAME
MECH 220 Engineering Materials
CIP Code: 14.1801**

Created by: Dr. Craig

Updated by: Dr. Lucas Craig

Canino School of Engineering Technology

Department: MECHANICAL ENGINEERING TECHNOLOGY

Semester/Year: Spring 2025

A. **TITLE:** Engineering Materials

B. **COURSE NUMBER:** MECH 220

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

Credit Hours: 3

Lecture Hours: 3 per week

Lab Hours: per week

Other: per week

Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes No x ☐

E. **GER CATEGORY:** None: ☒ Yes: GER

If course satisfies more than one: GER

F. **SEMESTER(S) OFFERED:** Fall ☐ Spring ☒ Fall & Spring ☐

G. **COURSE DESCRIPTION:**

A study of the wide spectrum of materials used in manufacturing of discrete parts and machines. Materials structure, characteristics, mechanical properties and applications will be stressed for ferrous and non-ferrous metals, plastics, and composites.

H. **PRE-REQUISITES:** None ☐ Yes ☒ If yes, list below:

MATH 123, PHYS 121, or permission of instructor

CO-REQUISITES: None ☒ Yes ☐ If yes, list below:

I. STUDENT LEARNING OUTCOMES: (see key below)

By the end of this course, the student will be able to:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO & SUBSETS</u>	
A. Apply standard testing procedures to measure, collect, and interpret laboratory data for material testing in a team environment	SO 1		1-Comm Skills 5-Ind, Prof, Disc, Know Skills 4-Soc Respons	O Subsets T Subsets
B. Determine and identify the mechanical properties of material	SO 1		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
C. Identify material property-processing interactions related to heat treatment, cold working, and hot forming	SO 1		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	PS Subsets Subsets Subsets
D. Select the best material (metal, polymer, ceramics, or composite) for a patricular application	SO 1		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	PS Subsets Subsets Subsets
E. Appraise materials in terms of degradation, oxidation, corrosion, and failure	SO 1		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	PS Subsets Subsets Subsets

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KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	Communication Skills Oral [O], Written [W]
2	Critical Thinking <i>Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]</i>
3	Foundational Skills <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	Social Responsibility <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	Industry, Professional, Discipline Specific Knowledge and Skills

*Include program objectives if applicable. Please consult with Program Coordinator

J. APPLIED LEARNING COMPONENT: Yes ☒ No ☐

If YES, select one or more of the following categories:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement |
| <input type="checkbox"/> Internship | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement | <input type="checkbox"/> Research |
| <input type="checkbox"/> Practicum | <input type="checkbox"/> Entrepreneurship |
| <input type="checkbox"/> Service Learning | (program, class, project) |
| <input type="checkbox"/> Community Service | |

K. TEXTS:

Callister, William D. Fundamentals of Materials Science and Engineering: An Integrated Approach. 4th ed. Hoboken, NJ: John Wiley & Sons, 2012. Print. ISBN-10: 9781118061602

L. REFERENCES:

Tool and Manufacturing Engineers Handbook, Society of Manufacturing Engineers

Heat Treating, Metals Handbook, Vol. 4 ASM International

Introduction to Physical Metallurgy, Avner, McGraw-Hill General Dynamics series on nondestructive testing.

American Welding Society series on nondestructive testing, Van Vlack.

Elements of Materials Science and Engineering, Addison-Wesley

M. EQUIPMENT: None ☐ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Homework, Quizzes, Exams, Written Lab Reports

P. DETAILED COURSE OUTLINE:

I. Introduction to Materials in Manufacturing

II. The Nature and Structure of Materials

A. Atomic Structure

B. Atomic Bonding

C. Atomic Arrangement

III. Mechanical Properties of Materials

A. Mechanical

B. Strain Hardening and Annealing

IV. Structure of Materials

A. Ferrous Metals and Alloys

B. Nonferrous Metals and Alloys

C. Polymers

D. Composites

E. Wood

V. Degradation, Oxidation and Corrosion of Materials

A. Corrosion

B. Oxidation

C. Wear

Q. LABORATORY OUTLINE: None ☐ Yes ☐