North Central State College

MASTER SYLLABUS	2025-2026

A. Academic Division: Engineering Technology, Business & Criminal Justice Division

B. Discipline: Mechanical Engineering Technology

C. Course Number and Title: MECT2230 Engineering Materials

D. Assistant Dean: Brooke Miller, M.B.A.

E. Credit Hours: 3
Lecture: 2 hours
Laboratory: 2 hours

F. Prerequisites: None

G. Last Course/Curriculum Revision Date: Fall 2025 Origin date: 07/28/2011

H. Textbook(s) Title:

Essentials of Materials Science and Engineering
- Author: Askeland, Wright
- Copyright Year: 2019
- Edition: 4th
- ISBN #: 9781337385497

I. Workbook(s) and/or Lab Manual: None; Class Handouts will be distributed

J. Course Description: Physical metallurgy emphasizing commercial alloys, heat treatment, and surface treatment of the iron, steel, aluminum, copper, and aerospace metals. The laboratory covers basic metallographic techniques of specimen polishing, etching, and examination. (TAG # OET013)

K. College-Wide Learning Outcomes:

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

North Central State College
SYLLABUS ADDENDUM

Academic Division: Business, Industry, and Technology **Discipline:** Mechanical Engineering Technology
Course Coordinator:

Course Number: MECT 2230-CN1 **Course Title:** Engineering Materials
Semester / Session: Fall 2025 **Start / End Date:** 8/11/2025 – 12/12/2025

Instructor Information

Name: Md Saiful Islam **Credentials:** PhD, MSc, and BSc
Phone Number: 419-755-4717 **E-Mail Address:** sislam@ncstatecollege.edu
Office Location: Kehoe 234 **Office Hours:** Thursday: 12:00PM - 3:00PM and Friday 10:00AM - 12:00PM

I. Topical Timeline (Subject to Change):

Weeks	Topic	Assignment	Due Date
1	Introduction – Overview	Quiz-1 Lab-1 Home work	08/26/2025
2	Atomic Structure / Atomic Arrangements		
3	Atomic imperfections and Movements		
4	Mechanical Properties – part 1	Quiz-2, Home Work Lab-2 Lab-3 Lab-4	09/16/2025
5	Mechanical Properties – part 2		
6	Strain Hardening and Annealing		
7	Principles of Solidification		
8	Contents covered in Weeks 1 to 7	Midterm Exam	09/30/2025
9	Fall Break - No Class		10/6/2025 – 10/10/2025
10-11	Solid Solutions and Phase Equilibrium	Quiz-3 Lab-5 Lab-6	10/21/2025
12	Dispersion Strengthening & Eutectic Phase Diagram		
13	Heat Treatment of Steels and Cast Irons		
14	Ceramics	Quiz-4 Lab-7 Lab-8	11/18/2025
15	Polymers		
16	Composites		
17	Review		
18	**Final Exam**		12/9/2025
NOTE: THIS IS A TENTATIVE SCHEDULE. ASSIGNMENTS AND DUE DATES MAY BE CHANGED AT THE DISCRETION OF THE INSTRUCTOR.			

II. Course Assignments:

Lab work: Lab experiments have to be completed. Lab reports will be due in a week from completion.

Quizzes will be in class. Missed quizzes will not be made up and will result in a "0" score for the quiz.

Exams: If you must miss an exam (for any legitimate reason, e.g.: illness), please notify me as early as possible. No makeup examination permitted if instructor is not notified before the day of the scheduled examination.

III. Grading and Testing Guidelines:

Final Grade Calculation

Activity	Qty	Points	Percentage
Quizzes/Home Works	4	400	20
Lab Reports	8	800	30
Mid Term Exam	1	100	25
Final Exam	1	100	25

IV. Examination Policy:

1. The reasons for which a student will be excused from taking an examination:
   a. Hospitalization (with documented verification)
   b. Death in the immediate family (with documented verification)
   c. Personal illness or illness in immediate family - (doctor's excuse required).

2. A student who misses an examination for any reason is responsible for:
   a. Notifying the instructor before the day of the examination.
   b. Set up a new date for the examination through email from instructor.

3. No makeup opportunity will be given for absences of quizzes.

V. Class Attendance and Homework Make-Up Policy:

Attendance is required per NCSC policy. Class Absentees: No merit or demerit derived from attendance, unless it prevents you from taking a quiz or examination.

VI. Classroom Expectations:

Questions in class: Any questions regarding the material are welcome during the class. If something is not clear to you, it probably is not clear to others. So, ask questions. Your question not only helps yourself, but it also helps others. If your question is too specific and its answer is too long, I may invite you to ask me later in my office.

As a future professional in your field, **you will be expected to conduct yourself as a professional in this course in ALL work and communications** - be it assignments, discussions, Canvas Inbox, emails etc.

This includes but is not limited to:

- **Being respectful of classmates' opinions, work and comments**
- **Being respectful in communications with the instructor**
- **Being respectful of diversity (Note: Offensive "jokes", slurs or hate speech will NOT be tolerated)**
- **Using Non-Profane, Appropriate Language**

Failure to conduct yourself as a professional and meet standards above in this course will result in the following consequences:

- **1st Instance** = Written warning from the instructor documenting issue (No points deductions)
- **2nd offense** = Mandatory meeting with the instructor and or Department Chair or Division Dean (Related assignment/Participation subject to Point Deductions)
- **3rd offense** = College Disciplinary procedures filed with the NC State Judicial Committee as a violation of the Student Code of Conduct. **(Course Grade subject to F)**

Extreme or repeated unprofessional behavior will result in initiating college disciplinary procedures as outlined in the NC State Student Code of Conduct. NCSC Disciplinary hearings can result in a variety of consequences, including and up to suspension or being expelled from the college.

Academic Misconduct such as Plagiarism, Cheating, or Academic dishonesty are not tolerated in this class.

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. List how engineering materials, metals, polymers, ceramics, and composites are related in origin and structural characteristics. (crystal structure, organic composition and properties, basic chemistry and atomic structure)*	This material is covered in Chapters 2 and 4, over physical properties and structures of metals. It is also covered in the last section over composite materials (non-metallic origin, including organic). Exams – Throughout the term Final Exam
2. List the properties that must be reviewed when making materials selections. (modulus of elasticity, tensile strength, yield strength, shear strength)*	Physical properties of materials is covered in Chapter 7, Plastic Deformation, as well as during lab exercises performing yield, tensile and shear strength testing. Exams – Throughout the term Bi-weekly Lab Reports Final Exam
3. Differentiate between the properties of stiffness, strength, and toughness. (stiffness – modulus, strength – tensile strength, yield, shear strength)*	Physical properties relating to stiffness, strength and toughness are covered during lab exercises using Charpy Impact testing, tensile and shear testing. It is also covered in Chapters 4 and 7, Structure of Metals and Plastic Deformation. Exams – Throughout the term Bi-weekly Lab Reports Final Exam
4. Define vocabulary used in steel terminology.*	Multiple lessons contain vocabulary relating to steel. Chapters 11 thru 17 cover steel related terms from cast iron to stainless steel. This vocabulary is also presented during most labs. Exams – Throughout the term Bi-weekly Lab Reports Final Exam
5. Describe how steels are made. (melting, casting, hot rolling, cold rolling)*	This material is covered within Chapter 11 thru 17, specifically Chapter 11 on the melting, casting and rolling. Exams – First half of the term Final Exam
6. List and describe the common heat treatments used on steels. (annealing – heat and slow cool, quenching - fast cooling, tempering - low temperature reheating)*	Heat treating is covered in Chapters 13 and 14, Cooling Rates of Steel and Heat Treating. Lab exercises involved in quench and tempering high carbon steel is performed, as well as forging steel above its critical temperature. Exams – Throughout the term Final Exam
7. Describe how cold working and alloy additions alter steel properties. (increase strength, lower ductility)*	This material is covered in Chapter 7, Plastic Deformation as well as in lab exercises where steel is cold worked and hardness is monitored. Exams at Exams – Throughout the term Bi-weekly Lab Reports Final Exam

Outcomes	Assessments – How it is met & When it is met
8. Specify tool steels based upon their properties and the heat treatment to which they have been subjected. (evaluate operating temperature, strength, stiffness, cyclic loading)*	Tool steel material is covered in Chapter 15, along with a presentation of tool steels, their make-up and properties. A presentation of carbide cutters is also given. Exams – Second half of the term Final Exam
9. Develop a guideline on how to screen candidate materials and arrive at the proper choice.*	Chapter 7, Plastic Deformation, along with tensile tests and non-destructive hardness testing lab exercises are used to develop skills in material selection. This is also covered in each chapter as non-ferrous and non-metallic material information is introduced. Exams – Throughout the term Bi-weekly Lab Reports Final Exam
10. Demonstrate a basic understanding of polymers, aluminum, and copper	Chapters 18 through 23 cover non-ferrous materials, plus a presentation of composite materials provides information. Exams – Second half of the term Midterm Final Exam

M. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93–100	A	4.00	Superior
90–92	A-	3.67	Superior
87–89	B+	3.33	Above Average
83–86	B	3.00	Above Average
80–82	B-	2.67	Above Average
77–79	C+	2.33	Average
73–76	C	2.00	Average
70-72	C-	1.67	Below Average
67–69	D+	1.33	Below Average
63-66	D	1.00	Below Average
60-62	D-	0.67	Poor
00-59	F	0.00	Failure

N. College Procedures/Policies:

North Central State College believes that every student is a valued and equal member of the community.* Every student brings different experiences to the College, and all are important in enriching academic life and developing greater understanding and appreciation of one another. Therefore, NC State College creates an inclusive culture in which students feel comfortable sharing their experiences. Discrimination and prejudice have no place on the campus, and the College takes any complaint in this regard seriously. Students encountering aspects of the instruction that result in barriers to their sense of being included and respected should contact the instructor, assistant dean, or dean without fear of reprisal.

* *Inclusive of race, color, religion, gender, gender identity or expression, national origin (ancestry), military status (past, present or future), disability, age (40 years or older), status as a parent during pregnancy and immediately after the birth of a child, status as a parent of a young child, status as a foster parent, genetic information, or sexual orientation*

Important information regarding College Procedures and Policies can be found on the syllabus supplement located at https://ncstatecollege.edu/documents/President/PoliciesProcedures/PolicyManual/Final%20PDFs/14-081b.pdf