

**SYLLABUS**  
**MENG 3114 – 101: Materials Science**  
**(Required Course)**  
**Fall 2019**

**Instructor: Dr. Jan Brink**

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**Office Hours:** M: 1-5 pm; T: 9-12; W: 9-11 am and 1-2 pm

**Course Schedule:** Lecture: MWF: 11.00 – 11.50 a.m. Room 136 – You must take a lab with this class

Location: Lecture: McCoy 136

**CATALOG DESCRIPTION**

Study of the physical and mechanical characteristics of materials, and the effects of chemical composition, mechanical treatment, and thermal or heat treatment upon material properties. Companion lab.

**COURSE PRE-REQUISITES**

MENG 2223 and CHEM 1143

**OTHER PREREQUISITES**

Basic computer skills, MS Excel, hand calculator.

**REQUIRED TEXTBOOK**

Materials Science and Engineering an Introduction by William D. Callister, 9<sup>th</sup> edition and the lab book as required by the lab instructor

**REFERENCES**

Additional material might be handed out in class.

**TOPICS COVERED**

- Ch. 1: Introduction
- Ch. 2: Atomic Structure and Inter atomic Bonding
- Ch. 3: The Structure of Crystalline Solids
- Ch. 4: Imperfections in Solids
- Ch. 6: Mechanical Properties of Metals
- Ch. 7: Dislocations and Strengthening Mechanisms
- Ch. 8: Failure
- Ch. 9: Phase Diagrams
- Ch. 10: Phase Transformations: Development of Microstructure and Properties
- Ch. 11: Application and Processing of Metal Alloys
- Ch. 12: Structure and Properties of Ceramics
- Ch. 13: Applications and Processing of Ceramics
- Ch. 14: Polymer Structures
- Ch. 15: Characteristics, Applications, and Processing of Polymers
- Ch. 16 Composites

## COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

<b>Outcome-Related Course Learning Objectives</b>	Program Outcomes						
	1	2	3	4	5	6	7
Overall, to develop an understanding of fundamental concepts of crystalline and non-crystalline structures, defects, diffusion, phases, solidification, solid state phase transformations and apply the same to the major classes of materials: metals, ceramics, polymers, and composites.	x	x					
To enable students to understand why crystalline and non-crystalline structure of materials lead to widely different properties.	x						
To enable students to recognize that one of the important characteristics of a material is how it responds to different stresses, and that this response is related to the temperature of the material.	x	x					
To enable students to realize that equilibrium phase diagrams are useful in understanding the development and preservation of non-equilibrium structures and their attendant properties.	x						
To enable students to design heat treatments phase transformations for some alloy that will yield the desired room temperature mechanical properties.	x	x		x		x	
To enable students to make informed decisions involving materials selection and processing.	x	x		x			
To enable students to become familiar with the materials science and metallographic laboratory equipment.	x	x			x	x	
1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics							
2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors							
3: an ability to communicate effectively with a range of audiences							
4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts							
5: an ability function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives							
6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions							
7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies							

### CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT

This course contributes to the Engineering Science component of the program.

## COURSE ORGANIZATION AND ASSESSMENT

Attendance policy, etc.: The instructor adheres to the policies stated in the MSU Student Handbook in regard to class attendance, classroom behavior deemed detrimental to learning by other members of the class, academic dishonesty, and student rights. If you do not have a copy of this handbook, one can be picked up at the Office of Student Services

### General Education Statement:

1) Students in this course must demonstrate competency in written communication through written tests, homework and lab reports (lab portion) 2) Students in this course must demonstrate competency in basic use of computer word processing and spreadsheets (including computer graphing) through the formal preparation of certain laboratory experiments (lab portion). 3) Students in this course will always have their writing checked for grammar and spelling during the grading of all laboratory experiments.

### Grading formula for course:

$X = 0.65 X (\text{exam1 score} + \text{exam2 score} + \text{exam3 score}) + 0.20 * (\text{Laboratory participation and lab reports}) + 0.05 * (\text{Attendance and participation}) + 0.10 * (\text{Homework})$

Each exam counts for 21.66%, this includes the final exam and the students are required to sign up for one of the labs and attend them. A grade will be given for the lab portion (20%) and will be calculated in the final grade of the course.

**Course grade:** If the calculation of the total grade shown above is between 89.5 and 100, the grade is A; 79.5 to 89.4 B; 69.5 to 79.4, C; etc.

### Grading Scale

Value of X (in %)	Letter Grade
89.5-100	A
79.5-89.4	B
69.5-79.4	C
59.5-69.4	D
< 59.4	F

### Make-up tests

No absence from a test will be regarded as excused unless the student presents the instructor with a valid written excuse either before or within one week from the date of the missed exam.

### Concerning the Homework:

Homework should be turned in on the due date at the beginning of class time. The instructor does not want the students to work on homework during class time. Each day 20 % will be deducted for late homework or lab report starting at the due date and time. Each homework problem should be numbered with chapter and problem number. Once class starts, no homework will be accepted. Do not ask one of your classmates to turn in an assignment for you. It will not be accepted.

**LICENSED HANDGUN HOLDERS**

Senate Bill 11 passed by the 84<sup>th</sup> Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at <http://mwsu.edu/campus-carry/rules-policies>.

**DISCLAIMER STATEMENT**

Information contained in this syllabus, other than grading, late assignments, makeup work, and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

**Disability:**

Students with disability must be registered with Disability Support Services before classroom accommodations can be provided.

**FINAL EXAM:**

Monday Dec 9, 2019 10.30-12.30 pm