

Fall 2019

MTSE 301-001: Materials Science

Halina Opyrchal

Follow this and additional works at: <https://digitalcommons.njit.edu/phys-syllabi>

Recommended Citation

Opyrchal, Halina, "MTSE 301-001: Materials Science" (2019). *Physics Syllabi*. 95.
<https://digitalcommons.njit.edu/phys-syllabi/95>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Physics Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.

MTSE 301 – 001

FALL 2019

Instructor: Dr. Halina Opyrchal
Office: TIER 454

Tel. : 973 642-4283

E-mail: opyrchal@njit.edu

Class meets at: Monday – 2:30 – 3:50 PM, Thursday– 2:30 – 3:50 PM , KUPF 210

PREREQUISITE: Phys 111 and Phys 121, Chem 125 and Chem 126, Math 111 and Math 112 or equivalent.

TEXTBOOK: “FOUNDATIONS OF MATERIAL SCIENCE AND ENGINEERING”
William F. Smith, Javad Hashemi, Fifth Edition, McGraw-Hill, Inc.

Office hours: Wednesday, 10:00 – 11:20 AM Thursday, 10:00 -11:20 AM, TIER 454

YOUR FINAL LETTER GRADE in MTSE 301 will be based on a composite score for term’s work that includes the exam scores, the final exam score, the lecture quizzes scores and the homework scores. Here are the approximate weights to be used for calculating the composite score:

Exam 1 = 25% Exam 2 = 25% Final Exam = 35% Homework = 7% Lecture Quizzes = 8 %

The conversion of numerical to letter grades is as follows:

> 80% A; >75% to 80% B+; >66 %to 75% B; >58%-66% C+; >50%-58% C; <50% D and F.

COURSE POLICIES

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline (*end of the 10th week of classes*) will not be permitted unless extenuating circumstances are documented **through the Office of the Dean of Students**. The course instructor and the Dean of Students are the principal points of contact for students considering withdrawing from a course. When a student invokes extenuating circumstances for any reason (late withdrawal from a course, request for a make-up exam, request for an Incomplete grade) the student will be sent to the Dean of Students Office. The Dean of Students will be making the determination of whether extenuating circumstances exist or not and will be notifying the instructor accordingly. Instructors should never request or accept medical or other documents from students; such documents need to be submitted by the student to the Dean of Students.

HONOR CODE

“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

LEARNING OUTCOMES

For this course you can expect to be assessed on the following learning outcomes:

1. Comprehend the interrelations among structure, properties and performance of engineering materials.
2. Apply the principles of crystallography to understand the structure of materials.
3. Understand the effect of solid state imperfection on diffusion and mechanical properties of materials.
4. Analyze phase diagrams of binary alloy systems.
5. Understand the mechanical, electrical and optical properties of metals, semiconductors, ceramics and polymers
6. Apply the equations governing different processes in solid materials. Calculate unknown quantities based on physical relationships, boundary conditions, and known quantities.

COUNSELING AND ACADEMIC SUPPORT: The Center for Counseling and Psychological Services is committed to assisting students experiencing high levels of personal challenge and stress. If you need accommodations due to a disability please contact Ms. Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs.

<u>Date</u>	<u>Text Assignment</u>	<u>Homework</u>
<hr/>		
<i>Atomic Structure and Bonds</i>		
09/05	Chapt. 2 Sect. 2.1 – 2.4	2.19, 2.26, 2.28, 2.35, 2.67, 2.75, 2.82, 2.85, 2.86
09/09	Chapt. 2 Sect. 2.5 – 2.6	
<hr/>		
<i>Crystal and Amorphous Structure in Materials</i>		
09/12	Chapt. 3 Sect. 3.1 – 3.6	3.21, 3.22, 3.32, 3.44, 3.56, 3.63, 3.64, 3.65, 3.68, 3.72,
09/16	Chapt. 3 Sect. 3.9 – 3.12	3.75, 3.99
<hr/>		
<i>Solidification, Crystalline Imperfections, Diffusion in Solids</i>		
09/19	Chapt. 4 Sect. 4.1 – 4.5	4.6, 4.18, 4.23, 4.27, 4.32, 4.33, 4.42, 4.56
09/23	Chapt. 5 Sect. 5.1 – 5.4	5.08, 5.11, 5.15, 5.22, 5.31, 5.34, 5.40, 5.42
<hr/>		
<i>Mechanical Properties of Metals I</i>		
09/26	Chapt. 6 Sect. 6.1 – 6.5	6.13, 6.17, 6.24, 6.25, 6.40, 6.47, 6.49, 6.54
09/30	Chapt. 6 Sect. 6.6 – 6.10	6.57, 6.58, 6.63, 6.91
<hr/>		
<i>Mechanical Properties of Metals II,</i>		
10/03	Chapt. 7 Sect. 7.1 – 7.7	7.10, 7.13, 7.17, 7.21, 7.29, 7.30, 7.35, 7.38, 7.47
<hr/>		
<i>Phase Diagrams, Engineering Alloys</i>		
10/07	Chapt. 8 Sect. 8.1 – 8.10	8.8, 8.11, 8.22, 8.25, 8.26, 8.45, 8.50
<hr/>		
OCTOBER 10		
EXAM I		
<hr/>		
<i>Engineering Alloys</i>		
10/14	Chapt. 9 Sect. 9.2 – 9.4, 8	9.6, 9.21, 9.23, 9.32, 9.39, 9.41, 9.43, 9.58, 9.65
10/17	Chapt. 9 Sect. 9.5 – 9.7, 9	9.71, 9.107, 9.109
<hr/>		

MTSE 301 – 001

<u>Date</u>	<u>Text Assignment</u>	<u>Homework</u>
<hr/>		
<i>Polymeric Materials</i>		
10/21	Chapt. 10 Sect. 10.1 – 10.4	10.9, 10.13, 10.21, 10.60, 10.62, 10.64, 10.84, 10.85
10/24	Chapt. 10 Sect. 10.6, 10.10-10.12	10.94, 10.136, 10.138, 10.193
<hr/>		
<i>Ceramics</i>		
10/28	Chapt. 11 Sect. 11.1 – 11.5	11.7 11.10, 11.15, 11.28, 11.29, 11.66, 11.70, 11.71,
10/31	Chapt. 11 Sect. 11.6 – 11.11	11.72, 11.74, 11.77, 11.80, 11.86, 11.89 , 11.93, 11.112
<hr/>		
<i>Composite Materials</i>		
11/04	Chapt. 12 Sect. 12.1 – 12.3	12.8, 12.33, 12.38, 12.41, 12.42, 12.43, 12.79
11/07	Chapt. 12 Sect. 12.10 – 12.11	12.85, 12.86, 12.103
<hr/>		
NOVEMBER 11		EXAM 2
<hr/>		
<i>Corrosion</i>		
11/14	Chapt. 13 Sect. 13.1 – 13.4	13.14, 13.21, 13.39, 13.41, 13.42, 13.43, 13.49, 13.55
11/18	Chapt. 13 Sect. 13.4 – 13.7	13.61, 13.62, 13.79, 13.90
<hr/>		
<i>Electrical Properties of Materials</i>		
11/21	Chapt. 14 Sect. 14.1 – 14.3	14.7, 14.9, 14.15, 14.20, 14.22, 14.38 14.39, 14.40, 14.45,
11/25	Chapt. 14 Sect. 14.4 – 14.6	14.46, 14.47, 14.48, 14.54, 14.60, 14.75, 14.76, 14.81,
11/26	Chapt. 14 Sect. 14.7 – 14.8	14.81, 14.87, 14.91, 14.93, 14.99
<hr/>		
<i>Optical Properties of Materials</i>		
12/02	Chapt. 15 Sect 15.1 – 15.4	15.10, 15.13, 15.14, 15.19, 15.32, 15.37, 15.38,
12/05	Chapt. 15 Sect 15.5 – 15.7	15.41, 15.43, 15.47, 15.49, 15.55
<hr/>		
<i>Biological Materials and Biomaterials</i>		
12/09	Chapt. 17 Sect.17.1- 17.8	Reading only Review for Final
<hr/>		

IMPORTANT DATES:

NOVEMBER 26, TUESDAY FOLLOWS THURSDAY SCHEDULE
NOVEMBER 27, WEDNESDAY FOLLOWS FRIDAY SCHEDULE
THANKSGIVING RECESS – NOVEMBER 28-DECEMBER 01
READING DAY - DECEMBER 12
READING DAY - DECEMBER 13
FINAL EXAM PERIOD – DECEMBER 14 -20