

## MTSE 301 – 001

FALL 2018

Instructor: Dr. Halina Opyrchal

Office: TIER 454

Tel. : 973 642-4283

E-mail: [opyrchal@njit.edu](mailto: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: Monday, 10:00 – 11:20 AM*

*Thursday, 4:00 -5:20 PM*

**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, 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.

**Missed quizzes and exams:** There are no make-ups for in-class activities. If you miss a lecture quiz, you will receive a grade of zero. Students who anticipate an absence from an exam should discuss their situation with their instructor PRIOR TO their absence. In order to be qualified to receive a "make-up" exam, the student should present documentation for not being able to take the test as scheduled. If you miss an exam and the make-up exam you will receive a score of zero for that Exam. That score will be included in the calculation of your final grade.

**HONOR CODE STATEMENT:** As a student at New Jersey Institute of Technology, you are obliged to comply with the provisions of the NJIT Academic Honor Code. Any violations of NJIT Honor Code will be brought to the attention of the Dean of Students.

### 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.

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. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

| <b>Date</b>   | <b>Text Assignment</b>            | <b>Homework</b>   |
|---|-----------------------------------|---|
| <i>Atomic Structure and Bonds</i>                                     |                                   |   |
| 09/06   | Chapt. 2 Sect. 2.1 – 2.4          | 2.23, 2.27, 2.28, 2.37, 2.68, 2.75, 2.82, 2.85, 2.86        |
| 09/10   | Chapt. 2 Sect. 2.5 – 2.6          |   |
| <i>Crystal and Amorphous Structure in Materials</i>                   |                                   |   |
| 09/13   | Chapt. 3 Sect. 3.1 – 3.6          | 3.17, 3.18, 3.22, 3.32, 3.44, 3.50, 3.56, 3.63, 3.72, 3.78, |
| 09/17   | Chapt. 3 Sect. 3.9 – 3.12         | 3.92, 3.99  |
| <i>Solidification, Crystalline Imperfections, Diffusion in Solids</i> |                                   |   |
| 09/20   | Chapt. 4 Sect. 4.1 – 4.5          | 4.6, 4.18, 4.23, 4.27, 4.32, 4.33, 4.42, 4.56               |
| 09/24   | Chapt. 5 Sect. 5.1 – 5.4          | 5.08, 5.10, 5.11, 5.15, 5.22, 5.30, 5.42, 5.43              |
| <i>Mechanical Properties of Metals I</i>                              |                                   |   |
| 09/27   | Chapt. 6 Sect. 6.1 – 6.5          | 6.13, 6.17, 6.21, 6.25, 6.38, 6.30, 6.44, 6.49, 6.54        |
| 10/01   | Chapt. 6 Sect. 6.6 – 6.10         | 6.57, 6.63, 6.74  |
| <i>Mechanical Properties of Metals II,</i>                            |                                   |   |
| 10/04   | Chapt. 7 Sect. 7.1 – 7.3          | 7.2, 7.10, 7.13, 7.17, 7.18, 7.21, 7.29, 7.30, 7.35, 7.38,  |
| 10/08   | Chapt. 7 Sect. 7.4 – 7.7          | 7.47  |
| <b>OCTOBER 11</b>   |                                   | <b>EXAM 1</b>   |
| <i>Phase Diagrams, Engineering Alloys</i>                             |                                   |   |
| 10/15   | Chapt. 8 Sect. 8.1 – 8.10         | 8.8, 8.11, 8.22, 8.25, 8.26, 8.45, 8.50                     |
| <i>Engineering Alloys</i>   |                                   |   |
| 10/18   | 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         |
| 10/22   | Chapt. 9 Sect. 9.5 – 9.7, 9       | 9.71, 9.107, 9.109  |
| <i>Polymeric Materials</i>  |                                   |   |
| 10/25   | Chapt. 10 Sect. 10.1 – 10.4       | 10.9, 10.13, 10.21, 10.60, 10.62, 10.64, 10.84, 10.85       |
| 10/29   | Chapt. 10 Sect. 10.6, 10.10-10.12 | 10.94, 10.136, 10.138, 10.193                               |
| <i>Ceramics</i>   |                                   |   |
| 11/01   | Chapt. 11 Sect. 11.1 – 11.5       | 11.7, 11.10, 11.15, 11.28, 11.29, 11.66, 11.70, 11.71,      |
| 11/05   | Chapt. 11 Sect. 11.6 – 11.11      | 11.72, 11.74, 11.77, 11.80, 11.86, 11.89, 11.93, 11.112     |

**NOVEMBER 08**

**EXAM 2**

*Composite Materials*

|       |                               |  |
|-------|-------------------------------|--|
| 11/12 | Chapt. 12 Sect. 12.1 – 12.3   | 12.8, 12.33, 12.38, 12.41, 12.42, 12.43, 12.79 |
| 11/15 | Chapt. 12 Sect. 12.10 – 12.11 | 12.85, 12.86, 12.103                           |

---

*Corrosion*

|       |                             |  |
|-------|-----------------------------|--|
| 11/19 | Chapt. 13 Sect. 13.1 – 13.4 | 13.14, 13.21, 13.39, 13.41, 13.42, 13.43, 13.49, 13.55 |
| 11/20 | Chapt. 13 Sect. 13.4 – 13.7 | 13.61, 13.62, 13.79, 13.90                             |

---

*Electrical Properties of Materials*

|       |                             |  |
|-------|-----------------------------|--|
| 11/27 | Chapt. 14 Sect. 14.1 – 14.3 | 14.7, 14.9, 14.15, 14.20, 14.22, 14.40, 14.46, 14.47 |
| 11/29 | Chapt. 14 Sect. 14.4, 7, 8  | 14.48, 14.70, 14.75, 14.76, 14.77, 14.81, 14.91      |

---

*Optical Properties of Materials*

|       |                            |  |
|-------|----------------------------|--|
| 12/03 | Chapt. 15 Sect 15.1 – 15.4 | 15.10, 15.13, 15.14, 15.19, 15.32, 15.37, 15.38, |
| 12/06 | Chapt. 15 Sect 15.5 – 15.7 | 15.41, 15.43, 15.47, 15.49, 15.55                |

---

*Biological Materials and Biomaterials*

|       |                           |                                  |
|-------|---------------------------|----------------------------------|
| 12/10 | Chapt. 17 Sect.17.1- 17.8 | Reading only<br>Review for Final |
|-------|---------------------------|----------------------------------|

---

**IMPORTANT DATES:**

***NOVEMBER 20, TUESDAY FOLLOWS THURSDAY SCHEDULE***  
***NOVEMBER 21, WEDNESDAY FOLLOWS FRIDAY SCHEDULE***  
***THANKSGIVING RECESS – NOVEMBER 22-25***  
***READING DAY - DECEMBER 13, THURSDAY***  
***READING DAY - DECEMBER 14, FRIDAY***  
***FINAL EXAM PERIOD – DECEMBER 15 -21***