Materials Science and Engineering MTSE 3080.004 Materials Processing

Instructor: Rick Reidy Spring 2019

D108 Discovery Park Time: TTh 8:30-9:50AM

Office Hours: T 10:00-12pm Meeting Place: B158

Phone: 940-369-7115 Cell:940-390-5675

Email: [reidy@unt.edu](mailto:reidy@unt.edu)

Course Description:

This course emphasis is on the basic principles and strategies for processing of metallic, ceramic, electronic, and polymer materials. Processing topics will include refining of materials as well as methods to impart specific properties and shapes to a material. Prerequisite(s): MTSE 3040.

Course Objectives

*By the end of the course, you be able to:*

* Select materials for specific applications based on their structure and properties and the necessary processing techniques.
* Apply thermodynamics and diffusion to process metals
* Understand high temperature processing of metals and ceramics
* With basic knowledge about different polymer classes (thermoplastics, thermosets, elastomers), to predict and design processing procedures for each.
* Be able to describe the basic processes in integrated circuit device manufacturing

Course Requirements:

Attendance is expected for each class because your participation in discussions is crucial this course. If you are unable to make a class, please let me know (text or email) so that I don’t wait for you. 10 or more unexcused absences will lead to a student being dropped from the class. Excused absences include illness, family emergency, religious holiday, and any other unplanned difficulty as determined by the instructor. Five unexcused absences will result in a 5 point deduction from your final course grade. Each additional unexcused absence will result in an additional point deduction in your final course grade (up to 9 absences). While traffic and other issues present difficulties getting to Discovery Park by 8:30am, being more than 15 minutes late for class is disruptive and will be considered “being late.” Consequently, six unexcused late arrivals will result in a 0.5 point deduction from your final course grade. Each additional late arrival will result in an additional 0.5 point deduction in your final course grade.

**Required Textbook:**

None. Class notes will provided by the instructor.

Exams: There will be two exams and a final worth 90% (30% each) of the total course grade. The Final exam will be in two parts: a written exam (75% of 30% or 22.5%) and an oral exam (25% of 30% or 7.5%). Exams will be based on the handouts, the text, and class discussions.

Missed Exams: Difficulties with exam dates must be addressed by the Friday before the assigned date. If an exam is missed, the student must contact the instructor within 12 hours of the start of exam to be permitted an opportunity to make-up the assignment. Make-up exams will cover the same material as the original exam, but may not use the same questions.

Homework: There will be two homeworks assigned during class and due one to two weeks after assigned (specific date will be noted on the homework sheet). The homeworks are worth 10% of the total grade.

Grades will be based on :

two exams (30% each), two homeworks (10%) and a combined written and oral final (30%)

Extra Credit: TBA

**Grade Distribution**

90-100 A

80-89 B

70-79 C

60-69 D

< 59 F

**Disabilities Accommodation:**

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940-565-4323 during the first week of class.

Additional Policies and Procedures:

Cell Phones: Please remember to turn off phones prior to class.

Extra Help: Please do not wait for the last minute. If you are having trouble with this class, please come by my office see me. You can make an appointment or just drop in.

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| **Date** | **Topic** | **Date** | **Topic** |
| **Jan 15\*\*** | **Thermodynamics, Metal processing** | **Mar 19** | **thin films-- film deposition, metal,** |
| **Jan 17** | **Metal separation, hydrometallurgy** | **Mar 21** | **Oxidation and diffusion in silicon** |
| **Jan 22** | **Pyrometallurgy** | **Mar 26** | **Ion implantation** |
| **Jan 24** | **Powder metal processing** | **Mar 28** | **Wet processes, Plasma processing** |
| **Jan 29** | **High temperature metal processing** | **Apr 2** | **No class** |
| **Jan 31** | **Metal heat treatment, phase transformations** | **Apr 4** | **dielectrics, review** |
| **Feb 5** | **Metal hardening and strengthening, review** | **Apr 9** | **Second exam** |
| **Feb 7** | **First Exam** | **Apr 11** | **Intro to polymers,** |
| **Feb 12** | **Intro, Ceramic Processing** | **Apr 16** | **Polymer synthesis** |
| **Feb 14** | **powder synthesis** | **Apr 18** | **Thermoplastics, thermosets** |
| **Feb 19** | **Sol-Gel synthesis** | **Apr 23\*\*** | **Polymer melt processing, extruding** |
| **Feb 21** | **Ceramics high temperature processing** | **Apr 25** | **Polymer processing** |
| **Feb 26** | **Glass processing** | **April 39** | **Composites** |
| **Feb 28** | **Ceramic densification** | **May 2** | **Final review--Jeopardy** |
| **Mar 5\*\*** | **introduction, electronic materials, Silicon** | **May 7** | **FINAL EXAM (comprehensive- written)** |
| **Mar 7** | **IC construction** | **May 6-10** | **FINAL EXAM (oral) TBA** |
| **Mar 11-15** | **SPRING BREAK** |  |  |

\*\* classes will end at 9:25