**MSE 440, 540 Processing of Metallic Materials Fall 2024**

**Building, 00313 Monteith Engineering Re TTH 3:00-4:15 PM**

**Instructor:** Bharat Gwalani**;**

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**Pre-requisites:** MSE 360, 370 or permission of the instructor. Co-requisite: MSE 420

**Course Objectives: Upon satisfactory completion of this course, students will:**

1. Understand the physical principles related to the processing of metallic materials such as solidification theory, metal forming theory, theory of chip formation in machining, etc.
2. Be familiar with the common metal processing technologies both from classroom study and from field trips.
3. Be able to optimize the design of processing variables to obtain sound materials free from defects.

**Textbook: Mikell P. Groover, Introduction to Manufacturing Processes, John Wiley & Sons, 2012.**

This class is taking part in NC State’s All-In program.  Course materials are delivered electronically on my Moodle site.  This is the most cost-effective way for you to get the materials you need to succeed in my course.

You have free access to materials through the drop/add date.  You must purchase access during that time using the link on my Moodle page to the bookstore’s website.  If you do not purchase access by the drop/add date, YOU WILL LOSE ACCESS TO THE COURSE MATERIALS and will then have to acquire the materials through another source.

**Office hours: Wednesdays – 11am-12 pm (in person or zoom)**

**Office- 3030 F**

[**Zoom link**](https://ncsu.zoom.us/j/98394361572?pwd=URFjpAtLi4eKSbNc4tbMDsRdXQpvh3.1)

**Tentative Class Schedule**

**Date Topic**

**Aug. 20 Introduction, solidification theory**

**Aug. 22 Solidification theory, heat flow**

**Aug. 27 Solute redistribution**

**Aug 29 Structure of castings, casting processes**

**Sept. 3 Casting processes, pouring and feeding castings, defects**

**Sept. 5 Casting alloys**

**Sept. 10 Joining processes, welding, brazing, soldering**

**Sept. 12 Principles of deformation processing: forging**

**Sept. 17 Wellness Day – No Classes**

**Sept 19 Forging, Rolling**

**Sept. 24 Review for Exam #1**

**Sept. 26 Exam #1**

**Oct 1 Extrusion, wire drawing**

**Oct. 8 Wire drawing, sheet metal working, shearing**

**Oct. 10 Bending, stretch forming, deep drawing, superplasticity**

**Oct. 17 Machining**

**Oct. 22 Powder metallurgy**

**Oct. 31 Additive Manufacturing**

**Nov. 5 Solid Phase Processing**

**Nov. 7 Surface treatments**

**Nov. 12 Non-equilibrium processing, metallic glasses**

**Nov. 14 Survey of non-equilibrium processing methods**

**Nov. 19 Review for Test # 2**

**Nov. 21 Test #2**

**Nov. 26 Work on Final Report**

**Nov. 28 Thanksgiving**

**Dec. 3 Final Project Report Due**

**Grading: MSE 440 Test #1 25%**

**Test #2 25%**

**Homework 20%**

**Plant trip reports 10%**

**Project and Report 20%**

**Grading: MSE 540 Test #1 30%**

**Test #2 30%**

**Homework 20 %**

**Term paper and Report 20%**

**Course grading.**

**The grading will follow the guidelines given below.**

**96 and above A+**

**92-95 A**

**88-91 A-**

**84-87 B+**

**80-83 B**

**76-79 B-**

**72-75 C+**

**68-71 C**

**64-67 C-**

**60-63 D+**

**56-59 D**

**52-55 D-**

**51 and below F**

**ACADEMIC INTEGRITY**

As a student enrolled in this class, you are expected to honor the NCSU policies regarding academic integrity. (See Section 8 of the NCSU Code of Student Conduct for more information: [*http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm*](http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm)). The following excerpts are relevant:   
Academic Dishonesty: *"Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student's record or academic career."* A more detailed list of the University policies pertaining to academic integrity can be found on the Student Conduct website or in the Code of Student Conduct.   
  
*"The act of submitting work for evaluation or to meet a requirement is regarded as assurance that the work is the result of your own thought and study, produced without assistance, and stated in your own words, except as quotation marks, references, or footnotes acknowledging the use of other sources. The submission of work used previously must first be approved by the instructor prior to submission."*  
If you have questions regarding any matter relating to the standards of academic integrity in this course or on a given assignment, you should talk with the instructor prior to doing any work.   
  
If you are aware of another student in the class violating the academic integrity policies, please notify the instructor immediately. Once a violation has occurred, the case will be pursued through procedures outlined by the University. For more information about the procedures, see the Student Conduct web page: <http://www2.ncsu.edu:8010/student_affairs/osc/>

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the [Academic Accommodations for Students with Disabilities Regulation (REG02.20.1)](http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.28.php)"

Schedule:  Online class evaluations will be available for students to complete during the last two weeks of class (November 20 - December 7).  Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations.  All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructor.