

1. MME 1301-1101: Introduction to Metallurgical and Materials Design
2. 4 credits, 6 contact hours
3. Dr. Christopher M. Bradley
4. No required textbook
 - a. Books found in library, class handouts and online references
5. Specific course information
 - a. This course will introduce the student to effective procedures for solving simple metallurgical and materials engineering and design problems using mathematics, computers, basic measuring systems and devices, computational tools, and statistical concepts. The course will also introduce the student to the metallurgical and materials engineering profession, including the role and responsibilities of the engineer in today's society. The laboratory portion (MME 1101) will provide some hands-on, practice-oriented experiences..
 - b. MATH 1411 and ENGL 1311 (may be taken concurrently)
 - c. Required
6. Specific goals for the course
 - a. Learning Outcomes:
 - Identify, formulate and solve engineering problems by applying the principles of engineering, science and mathematics while using proper units and conversions (Exam 1-3)
 - Identify atomic bonding to structure, properties, processing and performance of engineering materials. (Exam 1)
 - Recognize crystalline structures to calculate atomic packing factor and density (Exam 1)
 - Describe the importance and use for non-destructive testing (Exam 2)
 - Observe tensile testing first-hand as a visual aid in order to identify the importance of mechanical properties of materials. (Exam 2)
 - Label and calculate results from tabulated and graphical stress-strain data (Exam 2)
 - Understand the mechanics of the various failure modes (fracture, fatigue and creep). (Exam 3)
 - Differentiate and properly label graphical data for fatigue, creep and CVN tests. (Exam 3)
 - Understand how processing techniques (solidification, plastic deformation and heat treatment) affect material properties. (Exam 3)
 - Observe metallographic procedures and calculate ASTM grain size (Exam 3)
 - Interpret isomorphous binary phase diagrams concepts (Exam 3)
 - Develop written and verbal communication skills through lab reports and presentations (Lab)

- Practice working as a team on an engineering firm project (Engineering Firm Project)
 - Conduct hands on experiments related to chemical and mechanical properties (Lab)
- b. Student Outcomes
- Outcome 3: An ability to communicate effectively with a range of audiences.
 - Outcome 4: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
 - Outcome 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.

7. Brief list of topics to be covered

- Developing the problem-solving and design skills of engineering
 - The role of analysis in engineering
 - Dimensions and units
 - Analysis methodology
 - Problem solving using common engineering concepts
 - Using spreadsheet software to analyze data and create professional graphics
- Engineering ethics, including honesty and “data ethics”
- Statistical analysis of data and drawing conclusions from experiments
- Writing concise and professional scientific and engineering reports
- Developing and delivering powerful presentations
- Planning your career path in metallurgy and materials engineering
- Enforcing laboratory/workplace/chemical safety principles to ensure safe work environments and establish fun hands-on activities