

IENG 301 Principles of Materials and Costing

SYLLABUS

Semester: Fall 2019, CRN 82392

Time and location: Room ESB E G83, 2-2:50 PM, Wed

Number of credit hours: 1 **Type of course:** Required

Description: Utilize a problem based approach to materials selection considering material properties, mechanical properties, design requirements, and economic considerations in the selection of materials and manufacturing processes.

Prerequisites: IENG 377

Textbook : *William D. Callister, Jr., Materials Science and Engineering: An Introduction, 9th Edition or earlier, John Wiley & Sons
**Introduction to Manufacturing Processes and Materials, Robert C. Creese, Marcel Dekker, 1999.

Instructor: Nelson F. Rekos, ME, MBA, PMP.
Adjunct Professor of IMSE Department
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Office Hours: Wed 3-4pm or by appointment

TA Katelyn Fields, email kmf0004@mix.wvu.edu
Tutoring hrs.

BSIE Student Outcome 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. *

BSIE Student Outcome 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors.

Methodology. Utilize a problem-based approach for considering material properties in the selection of materials for manufacturing processes. By the end of the course, the students will be able to understand and apply:

1. Basics of manufacturing engineering, manufacturing management specifically related to cost decision-making.
2. Principles and concepts on basic material properties, specifically related to crystal structures, density, and Miller Indices.
3. Principles and concepts on basic material properties, specifically related to general phase diagrams, invariant reactions, Iron-Carbon phase diagram.
4. Principles and concepts on mechanical material property relationships, engineering stress-strain, true stress-strain, and hardness for ferrous materials.
5. Principles and concepts on methods for increasing mechanical material properties.

Course Topics:

Class 1	Introduction
Class 2	Manufacturing Economics, Ch 1 Creese **
Class 3	Design, Material & Cost Relationships Ch 6 Creese **
Class 4	Atomic Structures & Bonding Ch 2 Project
Class 5	Structure of Crystalline Solids Ch 3 *
Class 6	Imperfections in Solids Ch 4 *
Class 7	Exam 1
Class 8	Mechanical properties of metals Ch 6 *
Class 9	Dislocations and Strengthening Mechanisms Ch 7 *
Class 10	Phase Diagrams Ch 9 Part 1 *
Class 11	Phase Diagrams Ch 9 Part 2 *
Class 12	Phase Transformations in Metals Ch 10 *
Class 13	Annealing and Heat Treatment of Steels Ch 11 *
Class 14	Applications and Processing of Metal Alloys
No Class 11/27	Thanksgiving Break
Class 15	Exam 2
Class 16	Review of Exam 2 and Review for Final Exam
Final Exam	Monday, Dec 16th at 11am- 1PM

Contribution of course to meeting the professional component:

Engineering topics 100%.

Course relationship to program educational outcomes:

1. Mechanical material properties, physical material properties (Outcome 1).

Grading:

Quizzes	10%
Test 1	30%
Test 2	30%
Final Exam	30%
Total	100%

Grading Scale:

- A = 90 – 100%
- B = 80 – 89%
- C = 70 – 79%
- D = 60 – 69%
- F = 59% or less

In-Class Quizzes (10%): There will be a minimum of three (3) In-Class Quizzes. These are surprise Quizzes (**not announced**) but they will look a lot like the recommended homework problems. There are no make-ups allowed for missed quizzes and but the lowest quiz score will be dropped.

Tests (60%): Two tests will be given during the semester. Tests will determine 60% (30% each) of your final average. If you arrive late you will not be given extra time to complete the test. Failure to attend a test results in the assignment of a zero for that test grade. There are no make-ups for missed tests

Final Exam (30%): The final exam is comprehensive of the course material covered during the semester. The exam will determine 30% of your final average. Failure to attend the final exam results in the assignment of a zero for the final grade.

General Exam Information:

- Tests and the Comprehensive Final will be closed book although you will be provided an official class cheat sheet that will also be posted in advance on Ecampus. You may not bring any other notes, cell phones, or other electronic device such as a smart watch. No headsets or hearing aids will be allowed.
- Students are required to check all pages of a test. Missing a test question is the sole responsibility of the student.
- Students that fail to write their name on the exam will be assigned a zero on the exam.

Statement on Attendance: Attendance will not be taken, however, students are responsible for all material covered in class. It is not the instructor's job to provide notes, etc. for students who have not attended lectures. Failure to attend on quiz/test days will result in a grade of zero on that quiz/test.

Statement on Student Behavior in the Classroom:

Since you are all professionals in training, you are expected to conduct yourself in a professional manner while in this class. While the class is in progress, everyone is expected to remove hats and sunglasses, **refrain from eating and drinking**, and **turn off cell phones**. Students are expected to refrain from talking to other students or creating any such unwanted noise or other disruptions during the class period. Disruptive students will be warned during the class period that such behavior will not be tolerated and will possibly be re-seated. If disruption continues, the student

will be required to leave the class and be referred to the Associate Dean for Academic Affairs for disciplinary action.

Academic Integrity:

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://campuslife.wvu.edu/r/download/220286>.

WVU Inclusivity Statement:

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>.

Prepared by: Nelson Rekos, IMSE