# COLLEGEWIDE COURSE OUTLINE OF RECORD

**METC 143, MATERIALS AND PROCESSES**

COURSE TITLE: Materials and Processes
COURSE NUMBER: METC 143
PREREQUISITES: Demonstrated competency through appropriate assessment or earning a grade of "C" or better in ENGL 093 Introduction to College Writing and ENGL 083 Reading Strategies for College, or ENGL 095 Integrated Reading and Writing, and MATH 100 Intermediate Algebra.
SCHOOL: Applied Science and Engineering Technology
PROGRAM: Mechanical Engineering Technology
CREDIT HOURS: 3
CONTACT HOURS: Lecture: 2 Lab: 2
DATE OF LAST REVISION: Spring, 2014
EFFECTIVE DATE OF THIS REVISION: Fall, 2014

CATALOG DESCRIPTION: Introduces students to structures, properties, processing, and applications of metals and ceramics commonly used in industry and develop problem solving skills in the areas of material selection, evaluation, measurement and testing.

MAJOR COURSE LEARNING OBJECTIVES: Upon successful completion of this course the student will be expected to:

1. Use phase diagrams and metallographic specimens to explain the compositional and property differences between alloys of ferrous and non-ferrous metals, including determining what phases are present, their compositions and amounts.
2. Use stress-strain diagrams to determine material processes of both ferrous and non-ferrous metals.
3. Conduct metal property tests using standard methods and instrumentation.
4. Identify brittle and ductile failure types and describe the effect of temperature and surface defects on impact toughness.
5. Communicate with colleagues in their field using common terms of foundry, joining, powder metallurgy, hot/cold working, and ceramic fabrication industries.
6. Describe key processes and variable when working with molten metal.
7. Identify and differentiate between common single-use and multi-use mold processes by describing processes and listing advantages and disadvantages of each process.
8. Describe the common fabrication processes for amorphous and crystalline ceramics.
9. Describe a typical powder metallurgy manufacturing process and explain its advantages and disadvantages.
10. Identify the basic material removal processes: turning, boring, drilling, reaming, milling, sawing, broaching, shaping, and grinding and determine the material removal processes that can effectively execute a given manufacturing task.
11. Determine the basic cold forming processes that can effectively execute a given manufacturing task.

12. Describe and differentiate between the hot working processes of rolling, forging, and extrusion and predict the results of heat treating metal alloys.
13. List advantages and disadvantages of joining process including common fusion and solid-state welding processes and integral, discrete, and shrink/expansion fastener systems.
14. Present data on metal/ceramic materials or processes orally and visually.

COURSE CONTENT: Topical areas of study include –

Phase diagrams
Stress-strain diagrams
Material property tests and instrumentation
Material removal processes
Cold forming processes
Ceramic fabrication processes
Hot working processes
Joining processes for materials
Manufacturing processes
Failure testing of materials
Material property testing

HOW TO ACCESS THE IVY TECH COMMUNITY COLLEGE LIBRARY:

The Ivy Tech Library is available to students on- and off-campus, offering full text journals and books and other resources essential for course assignments. Go to http://www.ivytech.edu/library/ and choose the link for your campus.

ACADEMIC HONESTY STATEMENT:

The College is committed to academic integrity in all its practices. The faculty value intellectual integrity and a high standard of academic conduct. Activities that violate academic integrity undermine the quality and diminish the value of educational achievement.

Cheating on papers, tests or other academic works is a violation of College rules. No student shall engage in behavior that, in the judgment of the instructor of the class, may be construed as cheating. This may include, but is not limited to, plagiarism or other forms of academic dishonesty such as the acquisition without permission of tests or other academic materials and/or distribution of these materials and other academic work. This includes students who aid and abet as well as those who attempt such behavior.

COPYRIGHT STATEMENT:

Students shall adhere to the laws governing the use of copyrighted materials. They must insure that their activities comply with fair use and in no way infringe on the copyright or other proprietary rights of others and that the materials used and developed at Ivy Tech Community College contain nothing unlawful, unethical, or libelous and do not constitute any violation of any right of privacy.

ADA STATEMENT:

Ivy Tech Community College seeks to provide reasonable accommodations for qualified individuals with documented disabilities. If you need an accommodation because of a documented disability, please contact the Office of Disability Support Services.

If you will require assistance during an emergency evacuation, notify your instructor immediately. Look for evacuation procedures posted in your classroom.