

- I. Department, Number, and Title of Course:**
Mechanical Engineering and Energy Processes, ME 472 (3), Materials Selection for Design
- II. Designation as a ‘Required’ or ‘Elective’ Course:**
Required
- III. Course (catalog) Description:**
Interaction of material design process with material selection criteria. Comparison of materials properties, processes and fabrication. Project work includes design models, materials selection rationale, oral presentation of projects, construction of mock-up models, and theoretical design problems in the area of the student’s specialization.
- IV. Prerequisite(s):**
Engineering 222b, 312
- V. Textbook(s) and/or Other Required Material:**
The Principles of Materials Selection for Engineering Design, P. Mangonon, Prentice Hall, First Edition, 1998, ISBN: 132425955
Supplemental Text Book: Materials Selection in Mechanical Design, Michael F. Ashby, Elsevier, Third Edition, 2005, ISBN: 0750661682
Handouts provided by instructor
- VI. Course Objectives:**
To introduce students to the materials selection for design; engineering materials used to design components; material properties and applications. To provide an understanding of materials selection in design; relationship between material types, their manufacturing, structural aspects and properties; design stages and material selection methods. To give the students the basic knowledge of the materials selection by using functions, performance requirements, and properties of engineering materials for design.
- VII. Topics Covered:**
- | | |
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| 1. Introduction..... | 3 lectures |
| 2. Properties of Materials for Design of Structure & Component.... | 3 lectures |
| 3. Electrical Properties of Materials..... | 3 lectures |
| 4. Physical Properties-Microstructure Insensitive..... | 3 lectures |
| 5. Mechanical Properties of Materials | 3 lectures |
| 6. Strength of Materials-Test Methods | 3 lectures |
| 7. Design, Selection, and Failure of Materials..... | 6 lectures |
| 8. Selection of Ferrous and Nonferrous Materials..... | 3 lectures |
| 9. Selection of Ceramics and Glasses | 3 lectures |
| 10. Selection of Plastics | 2 lectures |
| 11. Materials Selection Case Studies..... | 4 lectures |
- VIII. Class/Laboratory Schedule:**
Meets 2 times/week, each period 75 minutes duration.
- IX. Contribution of Homework, Quizzes, Tests, Laboratory Reports, or Research Papers:**
Final exams 40%; Term Project 30%; Homework 20%; Tests 10%

X. Contribution of Course to Meeting the Professional Component.

Strong: See course outcomes

Mechanical Engineers are required to have knowledge of materials and problem solving skills to determine which materials can be used in particular designs. The nature of design requires working in teams. Course work includes using knowledge of math, chemistry, physics and engineering topics. Students are required to solve open-ended material/design selection projects (term project), give oral presentations and write technical reports.

Engineering Design: 2 credits (67 %) Engineering Science: 1 credit (33 %)

XI. Relationship of Course to Program :

Outcome Code	Outcome Description	ME 472
ME-OUT 1	The ability to apply knowledge of mathematics, science and engineering to problem solving	S
ME-OUT 2	The ability to design and conduct experiments, as well as to analyze and interpret data	M
ME-OUT 3	The ability to design a system, component, or process to meet desired needs within realistic constraints	S
ME-OUT 4	The ability to function on multi-disciplinary teams	S
ME-OUT 5	The ability to identify, formulate and solve engineering problems	S
ME-OUT 6	An understanding of professional and ethical responsibility	W
ME-OUT 7	The ability to communicate effectively	S
ME-OUT 8	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	S
ME-OUT 9	A recognition of the need for and an ability to engage in life-long learning	M
ME-OUT 10	Knowledge of contemporary issues	M
ME-OUT 11	The ability to use the techniques, skills and modern engineering tools necessary for engineering practice	S

S = Strong, M = Medium, W = Weak

XII. Person(s) who prepared this description and date of preparation:

Dr. Peter Filip, 12/29/2013

"We emphasize student achievement and success because achievement and success are essential if we are to shape future leaders and transform lives."

Syllabus Attachment

Spring 2014

<http://pvcaa.siu.edu/>

IMPORTANT DATES *

Semester Class Begins.....	01/13/2014
Last day to add a class (without instructor permission):	01/24/2014
Last day to withdraw completely and receive a 100% refund:	01/26/2014
Last day to drop a course using SalukiNet:	03/23/2014
Last day to file diploma application (for name to appear in Commencement program)	03/28/2014
Final examinations:.....	5/5 – 5/9/2014

* Note: For outreach, online, and short course drop/add dates, visit Registrar's Academic webpage

<http://registrar.siu.edu/>

SPRING SEMESTER HOLIDAYS

Martin Luther King, Jr.'s Birthday 01/20/2014

Spring Vacation 03/08—03/16/2014

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit

<http://registrar.siu.edu/pdf/ugradcatalog1314.pdf>

INCOMPLETE POLICY~ Undergraduate only

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or *graduation*, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of *F* and the grade will be computed in the student's grade point average. *For more information please visit:*

<http://registrar.siu.edu/grades/incomplete.html>

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A,B,C,D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. *See full policy at*

<http://registrar.siu.edu/pdf/ugradcatalog1314.pdf>

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit <http://gradschool.siu.edu/about-us/grad-catalog/index.html>

DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements.

<http://disabilityservices.siu.edu/>

STUDENT CONDUCT CODE http://policies.siu.edu/other_policies/chapter3/conduct.html

1 Southern Illinois University Carbondale. (2013). *Pathways to Excellence: A Strategic Plan* Retrieved from http://chancellor.siu.edu/common/docs/A_Strategic_Plan.pdf

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: (618) 453-5714, or siucares@siu.edu, <http://salukicare.siu.edu/index.html>

EMERGENCY PROCEDURES

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the **SIU Emergency Response Plan** and **Build- ing Emergency Response Team (BERT)** programs. Emergency re- sponse information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website at www.dps.siu.edu (disaster drop down) and the Emergency Response Guideline pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. *It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.*

INCLUSIVE EXCELLENCE

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. *For more information please visit:* <http://www.inclusiveexcellence.siu.edu/>

MORRIS LIBRARY HOURS

<http://www.lib.siu.edu/about>

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

Tutoring : <http://tutoring.siu.edu/>

Math Labs http://tutoring.siu.edu/math_tutoring/index.html **WRITING CENTER**

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit <http://write.siu.edu/>

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. *For more information visit:* <http://diversity.siu.edu/#>

Additional Resources Available:

SALUKINET: <https://salukinet.siu.edu/cp/home/displaylogin>

ADVISEMENT: <http://advisement.siu.edu/>

PROVOST & VICE CHANCELLOR: <http://pvcaa.siu.edu/>

SIU ONLINE: <http://online.siu.edu/>

Spring 2014 R.O'Rourke