EMEC 465: BIO-INSPIRED ENGINEERING

CATALOG DATA:
EMEC 465 – BIO-INSPIRED ENGINEERING: 3 credits (3 lecture). Prerequisites: EM 335, ME 320, ENGR 310; consent of instructors for non-majors. Design solutions in nature as paradigms for engineering problem solutions. Structure, thermal, and fluid concepts in nature applied to engineering. Advanced applications include smart structures, self-healing materials, and robotics.

TEXTBOOK:

INSTRUCTOR:
Dr. C. H. Jenkins, Roberts 220, 994-2203, 994-6292 (fax), cjenkins@me.montana.edu
Office Hours: Any time my door is open. If you have trouble meeting with me, please see the M&IE office staff, or phone or email me, for an appointment.

ENTRANCE EXPECTATIONS:
As this is a senior-level course, the student is expected to bring together foundational knowledge from a number of course in their undergraduate experience. Specifically, the student is expected to apply:
1) Principles of mechanics, including basic statics, strength of materials, fluid mechanics, and thermodynamics
2) Engineering mathematics, including differential equations
3) Written and oral communication skills
4) Problem solving skills
5) Basic principals of modern engineering design

COURSE OBJECTIVES AND OUTCOMES:
The objective of this course is to prepare the student to use design solutions in nature as inspiration for solving engineering design problems. Upon completion of this course, the student will be able to demonstrate the following learning outcomes:
1) Describe the basic principles of design in biological systems.
2) Perform basic structural, thermal, and fluid analyses in biological and engineering systems.
3) Perform simple bio-inspired design process algorithms.
4) Explain applications such as smart structures, self-healing materials, and robotics relative to their biological analogs.
5) Effectively communicate engineering work by oral and/or written means

CLASS SCHEDULE:
MWF 9:00 – 9:50, ROBH 319

COMPUTER AND LABORATORY USAGE:
At various times, students will be required to use computers to better understand biological and engineering concepts, solve problems, and analyze results.
SPECIAL NEEDS INFORMATION:
Students with special needs or requiring special accommodations should contact the instructor or the campus Disabled Student Services Office at the earliest opportunity.

STUDENT CONDUCT
Students are expected to conduct themselves in accordance with the MSU Student Conduct Guidelines (http://www2.montana.edu/policy/student_conduct/), including the areas of academic honesty, behavior, and responsibilities.

For each class period, the student may reasonably expect to spend at a minimum between two and three hours in preparation for class and in solving homework problems. The student is expected to read the course notes and textbook. The student is expected and encouraged to ask questions regarding course material that is not clearly understood.

Use of electronic communication devices during class, labs, exams, etc., is prohibited unless otherwise expressly permitted.

ASSESSMENT AND EVALUATION:
Course objectives
The course objectives will be assessed by the following methods:
1. Exit interview
2. Alumni survey

Course outcomes
Final letter grades will be based on a curve using the following:
- Homework = 20% (Learning Outcomes 1-5)
- 3 unit exams @ 20% = 60% (Learning Outcomes 1, 2, 4)
- Project = 20% (Learning Outcomes 3, 5)

ME, MET, and IE students who are exempt from the Board of Regents C- policy must understand that a D- grade is not considered passing by the M&IE Department. A grade of D- in any required course must be repeated, with a D or higher grade earned, for it to apply to degree requirements.

Unless otherwise specified, homework assigned during any week is due in class the following Wednesday. A weekly homework review session will be scheduled.
Note: Late assignments will be penalized, or may not be accepted, at the discretion of the instructor unless prior communication regarding such lateness has occurred. No make-up exams or assignments are planned.

COURSE WEB SITE: For course information log into D2L at https://ecat.montana.edu/

COURSE TOPICAL CONTENT:
See Weekly Topical Schedule