Nature Inspired Engineering Syllabus

CEE4803-D Special Topics, Spring 2027

Instructor Information

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General Course Information

Description

This course introduces students to the inspiration from biological and natural systems to solve engineering challenges. Topics to be covered in this course include the fundamentals of adaptability and sustainability, biomimicry principles, bio-mediated processes, biological inspiration, and principles and processes of bio-inspired engineering.

Course Learning Outcomes

- To provide the student with an overall understanding of bio-inspired design: principles, philosophies, methodologies, and tools;
- To showcase and discuss examples of bio-mediated and bio-inspired solutions to address emerging engineering challenges regarding adaptability, sustainability, and energy efficiency;
- To guide students to complete conceptual bio-mediated and bio-inspired designs to address a chosen engineering challenge;
- To promote innovative solutions, critical thinking, and engineering judgment.

By the end of this course, students will be able to:

- Understand fundamental concepts, including being able to recognize, differentiate, and interpret biomimicry, biomechanics, bionics, bio-mediation, bio-inspiration, and bioethics;
- Conduct independent/collaborative and original studies, including the gathering of information to propose, create, and document the study and its resolution;
- Critique and synthesize literature (in assessing, interpreting, and understanding data), and apply learned knowledge in developing bio-inspired solutions;

- Apply inferences toward a bio-mediated and/or bio-inspired solution, identify significant and probable implications, and consider the potential consequences of the proposed solution from all stakeholders' points of view;
- Collaborate and present scientific results in written and oral formats.

Required Course Materials

No textbooks are required for this course. Lecture notes and additional required/recommended references for each section of the course will be distributed during the term. The following references cover most of the material presented in this course and can be used for further reading:

Grading Policy:

Exam I	15%	
Exam II	15%	
Exam III	15%	
Homework	20%	Due throughout the semester
Pop quiz	5%	Note: missing a pop quiz without earlier approval from the instructor is considered as an unexcused absence and will result in -1% per missing pop quiz toward the final grade.
Project	30%	

Final Grade: $A \geq 90\% > B \geq 80\% > C \geq 70\% > D \geq 60\% > F$

Course Policies

Attendance and/or Participation

Exams: We will have three exams that will be given in person.

Class Participation: Active engagement is essential to learning, and we encourage you to participate by asking questions and sharing insights and additional details in class.

Homework Assignments: Homework assignments are different for undergraduate versus graduate students.

Assignments for undergraduates are designed to reinforce learning from lectures, including mainly calculations and problem-solving.

Assignments for graduate students are literature reviews and critiques. Details of deliverables refer to the 'Literature Review Guidelines' section.

Project: Undergraduate students will be assigned an entrepreneurship project and graduate students will work on a research project. Refer to the 'Entrepreneurship Project Guidelines' or 'Research Project Guidelines' sections for details.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated career competencies. This resource developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.