Course Syllabus

Jump to Today Edit

EGM 4853: Bio-Fluid Mechanics and Bio-Heat Transfer

Department of Mechanical and Aerospace Engineering

Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on announced in class and on CANVAS.

Lecture times and days: 6th Period (12:50-1;40 pm) MWF, McCarty Hall A (MCCA) Rm 1142

Office hours: Mon and Wed 9:30-11:00 am in Wertheim Rm 497 or by appointment

Class Web Site: CANVAS

Instructor: Dr. Malisa Sarntinoranont

Office Phone: 392-8404

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Office: Wertheim Rm 497

Catalog Description: Credits: 3; Study of biothermal and fluid sciences. Emphasis on physiological processes occurring in human blood circulation and underlying mechanisms from an engineering prospective.

Pre-requisites and Co-requisites: *EGN 3353C Fluid Mechanics or equivalent course*

Textbook: Transport Phenomena in Biological Systems, G.A. Truskey, F. Yuan, D.F. Katz, Pearson Prentice Hall

Course Objectives: The objective of this course is to provide students with the necessary background in biofluid and thermal sciences in order to allow them to better understand the physiological processes that occur in the human body and analyze the physical mechanisms that underlie them. It stresses fundamental engineering science principles applied to physiological processes. Students will learn to apply the conservation equations to control volumes and express them through mathematical formulations, with emphasis on biological systems. Upon completion of this course, students are expected to understand basic fluid mechanical and heat transfer solution techniques, coupled with a strong foundation and appreciation for the underlying biology and physics of physiological processes.

Contribution of course to meeting the professional component:

EGM 4853 supports several program outcomes enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering. Specific ME program outcomes supported by this course include: (1) Using knowledge of chemistry and calculus-based physics with depth in at least one of them; (2) Using knowledge of advanced mathematics through multivariate calculus and differential equations; (3) Being able to work professionally in the thermal systems area.

Relation to Program Outcomes (ABET):

This course achieves the following ABET outcomes [note that the outcome number corresponds to the respective ABET outcomes (a) through (k):

(a) Apply knowledge of mathematics, science, and engineering **[high coverage; method of assessment is homework, exams, homework and/or a specially-designed project to measure Outcome (a)]**

(e) Identify, formulate, and solve engineering Problems **[high coverage; method of assessment is homework, exams, homework problems and/or a specially-designed project to measure Outcome (e)]**

(i) Recognize the need for, and engage in life long learning **[low coverage; method of assessment are certain homework problems that go beyond the scope of the book and a specially-designed project measure Outcome (o)]**

(k) Use the techniques, skills, and modern engineering tools necessary for engineering practice **[low coverage; method of assessment is homework and three exams and/or a specially-designed project to measure Outcome (k)].**

Assessment Methods: Your grade for this course will be determined based on your performance on homework and exams as follows:

Homework	25%
Exam #1	25%
Exam #2	25%
Review Paper & Presentation	25%

- There will be no final exam.
- Late homework will be deducted 10% each day late. (No late homeworks accepted for those due right before an exam since solutions will be posted early).
- Working in groups is permitted and encouraged. However, copying homework is NOT permitted. *Use of solution manuals to complete homework is considered cheating and a violation of the honor policy, and this policy will be fully enforced.*

Final project: A final paper and presentation will be due during the term. It will be assigned in the 2nd half of the class.

Proposed Grading:

93 - 100 = A
90 - 92.9 = A-
87 - 89.9 = B+
83 - 86.9 = B
80 - 82.9 = B-
77 - 79.9 = C+
73 - 76.9 = C
70 - 72.9 = C-
67 - 69.9 = D+
63 - 66.9 = D
60 - 62.9 = D-
<60 = F

REMARKS: Students are responsible for knowledge of all scheduling and policy announcements made in class.

Class Schedule

Wk.		Topic	Assigned Reading
1	1/8-1/12	Overview of human body	Ch 1
2	1/17-1/19	Cardiovascular system	Ch 1
3	1/22-1/26	Physical/Mechanical properties of Circulation	Ch 2
4	1/29-2/2	Fluid mechanics of blood flow	Ch 2
5	2/5-2/9	Flow in Arteries & Veins	Ch 3
6	2/12-2/16	Flow in Arteries & Veins	Ch 5
7	2/19-2/23	**Exam 1**	Ch 1-3 & 5

8	2/26-3/1	Microcirculation	Ch 2
9	3/4-3/8	Flow in the heart	Ch 5
10	3/11-3/15	Spring Break	
11	3/18-3/22	Heat Transfer review	Supplement
12	3/25-3/29	Thermal modeling & Body temperature regulation	Supplement
13	4/1-4/5	Bioheat equation	Supplement
14	4/8-4/12	**Exam 2**	
15	4/15-4/19	Current topics & Class Presentations	
16	4/22-4/24	**Project/paper due**	
		No Final	

Students Requiring Accommodations: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/

Links to an external site.. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Academic Honesty: UF students are bound by The Honor Pledge which states

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “

On my honor, I have neither given nor received unauthorized aid in doing this assignment

The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class. If you have any concerns, please consult with Dr. Sarntinoranont at anytime during the course.

Course Evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/Links to an external site.. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/Links to an external site.. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/Links to an external site..

In-Class Recording: Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Commitment to a Safe and Inclusive Learning Environment: The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use: All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy: There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.htmlLinks to an external site.

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.eduLinks to an external site., and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**Links to an external site., located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/Links to an external site..

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtmlLinks to an external site..
Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.eduLinks to an external site..
Library Support, http://cms.uflib.ufl.edu/askLinks to an external site.. Various ways to receive assistance with respect to using the libraries or finding resources.
Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/Links to an external site..
Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/Links to an external site..
Student Complaints Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/Links to an external site.;https://care.dso.ufl.eduLinks to an external site..
On-Line Students Complaints: *https://distance.ufl.edu/getting-help/*Links to an external site.; *https://distance.ufl.edu/state-authorization-status/#student-complaint*Links to an external site..