FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Biomedical engineering

College Engineering

*(To obtain a course number, contact **erudolph@fau.edu**)*

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner _____
Catalog _____

Prefix BME

Number 5313

(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)
Lab Code

Type of Course
Lecture

Course Title
Biomedical Engineering Cell Biology and Physiology

Credits *(See Definition of a Credit Hour)*
3

Effective Date *(TERM & YEAR)*
Spring 2025

Grading *(Select One Option)*
Regular (●)
Sat/UnSat ( )

Course Description *(Syllabus must be attached; see Template and Guidelines)*
Topics to be covered include: fundamentals of molecular biology, molecular biophysics, internal organization of the cell (structural and functional organization);energy generation and distribution; cell cycle and cell-cell interaction; human physiology; molecular and cellular basis of organ system function; integrated function of organ systems in homeostasis and human health; introduction to pathophysiology of human diseases.

Prerequisites
None.

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course.

Academic Service Learning (ASL) course ☐
Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Corequisites
None.

Registration Controls *(For example, Major, College, Level)*
BME, COECS, Graduate

Minimum qualifications needed to teach course:
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field).

List textbook information in syllabus or here
1M. Pavlovic: Bioengineering: Conceptual approach, Springer, 2015
2) W. Mark Saltzman: Biomedical Engineering, Bridging Medicine &Technology, Cambridge

Faculty Contact/Email/Phone
Mirjana Pavlovik/mpavlovi@fau.edu

List/Attach comments from departments affected by new course
There is no other course affected.

Approved by		*Date*
Department Chair	Francisco Presuel-Moreno (Digitally signed by Francisco Presuel-Moreno, DN: cn=Francisco Presuel-Moreno, o=Florida Atlantic University, ou, email=fpresuel@fau.edu, c=US, Date: 2024.09.23 11:07:01 -04'00')	8-12-24
College Curriculum Chair		9/23/24
College Dean	Raquel Assis	9/21/24
UGPC Chair		10/30/2024
UGC Chair		10/30/2024
Graduate College Dean		10/30/2024
UFS President		
Provost		

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.

FLORIDA ATLANTIC UNIVERSITY

BME 5313

Biomedical Engineering: Cell Biology and Physiology

Date: TBD
Building: TBD
3 Credit(s)
Spring 2025 - 1 Full Term

Instructor Information

Dr Mirjana Pavlovic MD, PhD

Email: mpavlovi@fau.edu

Office: EE-96, #514

Office Hours: TBD

Phone: 561-297-2348

Course Description

Description: Principles of cell biology, and systems physiology and pathophysiology.

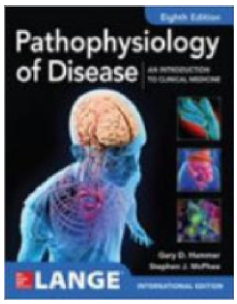
Topics: Fundamentals of molecular biology, molecular biophysics, organ system philology and pathophysiology.

Instructional Method

In-Person w/Recorded Lecture:

In-person class. Instructor will record the course for asynchronous viewing. Synchronous viewing may be an option at the discretion of the instructor. In-person attendance not required.

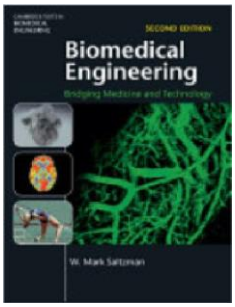
Required Texts/Materials



ISE Pathophysiology of Disease: An Introduction to Clinical Medicine 8E
ISBN: 9781260288513
Authors: GARY. MCPHEE HAMMER (STEPHEN.), Stephen J. McPhee
Publication Date: 2019-01-09

Recommended Readings and Materials

Bioengineering
ISBN:9783319107981
Authors: Mirjana Pavlovic
Publisher: Springer
Publication Date: 2014-10-10



Biomedical Engineering
ISBN: 9781107037199
Authors: W. Mark Saltzman
Publisher: Cambridge University Press
Publication Date: 2015-05-21

Course Objectives/Student Learning Outcomes

Internal organization of the cell (structural and functional organization); energy generation and distribution; Cell cycle and Cell-cell interaction; human physiology; molecular and cellular basis of organ system function; integrated function of organ systems in homeostasis and human health; introduction to pathophysiology of human diseases.

Faculty Rights and Responsibilities

Florida Atlantic University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise. To ensure these rights, faculty members have the prerogative to:

• Establish and implement academic standards.

• Establish and enforce reasonable behavior standards in each class.

• Recommend disciplinary action for students whose behavior may be judged as disruptive under the Student Code of Conduct University Regulation 4.007.

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Course Topical Outline

Lecture	Date	Topics	Comments (Book)
1	1/7	**Introductory remarks:** Fundamentals of molecular biology of the cell An overview of biological basics; cell architecture(structural and functional organization of the cell)	***M. Pavlovic: Bioengineering: Conceptual approach, Springer, 2015*** ***W. Mark Saltzman:*** **Biomedical Engineering, Bridging Medicine &Technology, Cambridge University Press, 2009** **Garry D Hammer and Stephen J. Mc Phee: Pathophysiology of Human Diseases, McGraw Hill / Medical; 8th edition (November 26, 2018)**
2	1/9	**Biomolecules:** macromolecules of life, molecular motors of the cells and their housekeeping functions ***(Chapter 2)***	
3	1/14	**Genomics**: Nucleic acids, Central dogma of molecular biology : oncogenes and tumor suppressor genes, the role of micro-RNA in the disease Technology behind human genome project: PCR and CRISPR/CASP. ***(Chapter 3)***	
4	1/16	**Proteomics**: Structural and Functional features Replication Transcription Translation Enzymes: role in the cells and tissues, basic elements of enzyme kinetics (Michaelis-Menten) ***(Chapter 4 and 5)***	*Pavlovic/notes*
5	1/21	**Molecular Biophysics /Cell physiology**: Cell structure and function, ion transport, membrane potentials, receptor-mediating endocytosis, and molecular signaling ***(Chapter 5)***	*Pavlovic/notes*
6	1/23	***Energy generation and distribution:*** *Glycolysis* *TCA (KREBS CYCLE)*	*Pavlovic/notes*

		Respiration *Oxidative phosphorylation (OX Phos)* *The proton-motive force of the respiratory chain* *ATP synthesis and energy distribution* *Electron transport through the inner mitochondrial membrane* *Synthesis of endogenous water*	
7	1/28	**Cell Cycle** Signal Transduction Pathways (Basics) ***(Chapter 6)*** **Cell-cell interactions:** Replication Transcription Translation	*Pavlovic/notes*
8	1/30	**Cell division, Death, and Dynamics of interacting cellular-fate processes,** **Scaling up techniques for ex vivo cultivation and cell separation**	*Pavlovic, Saltzman/notes*
9	2/4	**Humane Physiology**	*Pavlovic, Saltzman/notes*
10	2/6	**Respiration and digestion** Anatomy and physiology (**Chapter 7**)	*Pavlovic, Saltzman and papers/notes*
11	2/11	***Circulation*** *Anatomy and physiology, blood pressure, viscosity, heart cycle, gas exchange* ***(Chapter 8)*** ***Removal of molecules:*** *glomerular filtration, reabsorption and secretion in tubules, biliary transformation, and excretion*	*Pavlovic, Papers/notes*
12	2/13	***Communication systems in the body I*** ***Neural system*** ***Signal processing:*** *resting and action potentials in excitable tissues* ***(Chapter 9 and 10)***	*Pavlovic, To be given during the time*
13	2/18	***Biomechanics*** *Mechanical properties of materials, elastic and plastic deformations* *Energy storage with deformation, Mechanical properties of tissues and organs,* ***(Chapter 11)***	
14	2/20	**Communication systems in the body II: Endocrine system:** Receptors-ligands (hormones) types, messengers, kinetics of binding, hormone signaling **Signal Transduction Pathways** (Basics) ***(Chapter 12)***	
15	2/25	**Communication systems in the body III:** **Immune system** signaling and communication ***(Chapter 13)***	
16	2/27	**Molecular and Cellular Basis of Organ System Function** Integrated function of organ System Homeostasis and Human Health	*Saltzman and papers*
	3/1	**SPRING BREAK.NO CLASSES**	
17	3/11	**14. Introduction to the Pathophysiology of Human Diseases**	*Pavlovic, Saltzman/notes*
18	3/13	***15.Genetic Diseases*** *A. Overview* *B. Specific Topics*	*Chap 2. Genetic Diseases*
19	3/18	***16.Infectious Diseases*** *A. Overview* *B. Specific Topics*	*Chap 4. Infectious Diseases*
20	3/20	***17.Neoplastic Diseases*** *A. Overview* *B. Specific Topics*	*Chap 5. Neoplasia*
21	3/25	***18. Disorders of Blood and Immune System*** *A. Overview* *B. Specific Topics*	*Chap 6. Blood Disorders* *Chap 3. Immune System Disorders*

22	3/27	***19.Neural System Disorders*** *A. Overview* *B. Specific Topics*	*Chap 7. Nervous System Disorders*
23	4/1	***20.Endocrine System Disorders(endocrine pancreas, Thyroid, adrenal cortex, adrenal medulla)*** *A. Overview* *B. Specific Topics*	*Chap 15. Exocrine Pancreas* *Chap 15. Thyroid Disease*
24	4/3	***21.Disorders of Hypothalamus and pituitary gland*** *A. Overview* *B. Specific Topics*	*Chap 19. Hypothalamus & Pituitary*
25	4/8	***22. Disorders of the reproductive tract Male and Female*** *A. Overview* *B. Specific Topics*	*Chap 22. Female Tract* *Chap 23. Male Tract*
26	4/10	***23.Disorders of cardiovascular system (heart and vascular)*** *A. Overview* *B. Specific Topics*	*Chap 10. Heart Disease* *Chap 11. Vascular Disease*
27	4/15	***24.Pulmonary diseases*** *A. Overview* *B. Specific Topics*	*Chap 9. Pulmonary Disease*
28	4/17	**25. *Gastrointestinal Disease*** *A. Overview* *B. Specific Topics*	*Chap 13. Gastrointestinal Disease* *Pavlovic, Saltzman/notes*
	4/21	**Classes End**	
	4/30	**Final Exam** **Location:** TBA **Time:** TBA	
	4/30	**Semester Ends**	

Course evaluation Method

The Final Grade (100%) is the result of individual participation of the following:

Homework - 60 %
HW is an essential signifier to demonstrate conceptual understanding and requires work in writing. It includes two parts: the first is conceptual and second is mathematical.

Final Examination - 20 %
Multiple-choice exam on all the concepts covered during the course.

Final Project - 20%
Critical review on chosen topic covered in class or student's own research

Grading Scale:

90 and above: "A", 87-89: "A-", 83-86: "B+", 80-82: "B", 77-79 : "B-", 73-76: "C+", 70-72: "C", 67-69: "C-", 63-66: "D+", 60-62: "D", 51-59: "D-", 50 and below: "F."

** This scale can be slightly modified dependent on overall success*

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university's mission to provide a high-quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Attendance Policy Statement

Students are expected to attend all their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non- attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations, or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances, and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Religious Accommodation Policy Statement

In accordance with the rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. University Regulation 2.007, Religious Observances, sets forth this policy for FAU and may be accessed on the FAU website at www.fau.edu/regulations.

Any student who feels aggrieved regarding religious accommodations may present a grievance to the executive director of The Office of Civil Rights and Title IX. Any such grievances will follow Florida Atlantic University's established grievance procedure regarding alleged discrimination.

Time Commitment Per Credit Hour

For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out-of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

Course Grading Scale

Letter Grade	Percentage Grade
A	94-100%
A	90-93%
B	87-89%
B	83-86%
B	80-82%
C	77-79%

Grade Appeal Process

You may request a review of the final course grade when you believe that one of the following conditions apply:

• There was a computational or recording error in the grading.

• The grading process used non-academic criteria.

• There was a gross violation of the instructor's own grading system.

University Regulation 4.002 of the University Regulations contains information on the grade appeals process

Policy on Make-up Tests, Late work, and Incompletes

Exams will be given only at scheduled times. No one is exempt from the final examination. Makeup exams are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student from participating in the exam. Late work is not acceptable. Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation, incomplete grades will not be given.

Policy on the Recording of Lectures

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Artificial Intelligence Preamble

FAU recognizes the value of generative AI in facilitating learning. However, output generated by artificial intelligence (AI), such as written words, computations, code, artwork, images, music, etc., for example, is drawn from previously published materials and is not your own original work. FAU students are not permitted to use AI for any course work unless explicitly allowed to do so by the instructor of the class for a specific assignment.

Class policies related to AI use are decided by the individual faculty. Some faculty may permit the use of AI in some assignments but not others, and some faculty may prohibit the use of AI in their course entirely. In the case that an instructor permits the use of AI for some assignments, the assignment instructions will indicate when and how the use of AI is permitted in that specific assignment. It is the student's responsibility to comply with the instructor's expectations for each assignment in each course. When AI is authorized, the student is also responsible and accountable for the content of the work. AI may generate inaccurate, false, or exaggerated information. Users should approach any generated content with skepticism and review any information generated by AI before using generated content as-is.

If you are unclear about whether or not the use of AI is permitted, ask your instructor before starting the assignment.

Failure to comply with the requirements related to the use of AI may constitute a violation of the Florida Atlantic Code of Academic Integrity, Regulation 4.001.

Proper Citation:

If the use of AI is permitted for a specific assignment, then use of the AI tool must be properly documented and cited. For more information on how to properly cite the use of AI tools, visit www.fau.edu/ai/citation.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Student Support Services and Online Resources

- Center for Learning and Student Success (CLASS)
- Counseling and Psychological Services (CAPS)
- FAU Libraries
- Math Learniing Center
- Office of Information Technology Helpdesk
- Center for Global Engagement
- Office of Undergraduate Research and Inquiry (OURI)
- Science Learning Center
- Speaking Center
- Student Accessibility-Services
- Student Athlete Success Center (SASC)
- Testing and Certification
- Test Preparation
- University-Academic Advising Services
- University. Center for Excellence in Writing (UCEW).
- Writing Across the Curriculum (WAC)

Mahsa Ranji

From: Sarah Milton
Sent: Thursday, October 17, 2024 11:35 AM
To: Mahsa Ranji
Cc: Javad Hashemi
Subject: Re: New BME course

Good morning - Biology has no objection to you offering this course, though we are curious how you expect students to learn two very detailed subjects in one course/semester when they have struggled to do so in two separate courses in our department.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Chair
Department of Biological Sciences
FAU

From: Mahsa Ranji <mranji@fau.edu>
Sent: Wednesday, October 16, 2024 3:49 PM
To: Sarah Milton <smilton@fau.edu>
Cc: Javad Hashemi <jhashemi@fau.edu>
Subject: New BME course

Dear Dr. Milton,

The new BME department is developing a new course, BME cell biology and physiology. This course is a broad introductory course for students in BME with engineering background that don't have any basic knowledge of cell biology and physiology.

Please see the attached information and let me know if you have any feedback about this by Oct 21st. If we don't hear back from you, we assume there is no objections about it. Thanks in advance.

Best regards,
Mahsa

Mahsa Ranji, **Ph.D.**
Professor and BME Associate Chair
BME and EECS Dept.
ISENSE & SNBI Fellow
Florida Atlantic University
777 Glades Road, Boca Raton 33431
Office: EE 315
Tel: (561)-297-0089

IEEE senior editor: https://www.embs.org/jtehm/editorial-board/
Biophotonics lab director: https://www.fau.edu/engineering/research/biophotonics/

cc-bme5313-biomedical-eng-cell

Final Audit Report 2024-10-31

Created:	2024-10-30
By:	Christine Kraft (kraftc@fau.edu)
Status:	Signed
Transaction ID:	CBJCHBCAABAAd6hlqc-wO9raUur0xfqs2qEZ8nTnq9sO

"cc-bme5313-biomedical-eng-cell" History

Document created by Christine Kraft (kraftc@fau.edu)
2024-10-30 - 7:58:46 PM GMT

Document emailed to sementel@fau.edu for signature
2024-10-30 - 7:58:55 PM GMT

Document emailed to rstackma@fau.edu for signature
2024-10-30 - 7:58:55 PM GMT

Email viewed by sementel@fau.edu
2024-10-30 - 8:00:44 PM GMT

Signer sementel@fau.edu entered name at signing as Arthur Sementelli
2024-10-30 - 8:01:41 PM GMT

Document e-signed by Arthur Sementelli (sementel@fau.edu)
Signature Date: 2024-10-30 - 8:01:43 PM GMT - Time Source: server

Email viewed by rstackma@fau.edu
2024-10-31 - 0:48:25 AM GMT

Signer rstackma@fau.edu entered name at signing as Robert W. Stackman Jr.
2024-10-31 - 0:48:57 AM GMT

Document e-signed by Robert W. Stackman Jr. (rstackma@fau.edu)
Signature Date: 2024-10-31 - 0:48:59 AM GMT - Time Source: server

Agreement completed.
2024-10-31 - 0:48:59 AM GMT