FLORIDA ATLANTIC UNIVERSITY

COURSE CHANGE REQUEST
Graduate Programs

Department Computer and Electrical Eng and Comp Science

College Engineering and Computer Science

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

***Current* Course Prefix and Number**	***Current* Course Title**
BME 5000	Introduction to Bioengineering

*Syllabus must be attached for **ANY** changes to current course details. See Guidelines. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:
Introduction to Biomedical Engineering

Change prefix

From: **To:**

Change course number

From: **To:**

Change credits*

From: **To:**

Change grading

From: **To:**

Academic Service Learning (ASL) **

Add ☐ **Remove** ☐

* Review Provost Memorandum
** Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Change description to:
Course provides a broad perspective of biomedical engineering as applied to topics in contemporary biology, physiology, and medicine, including biotechnology and bioinformatics.

Change prerequisites/minimum grades to:
None

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade.

Effective Term/Year for Changes: Summer 2021

Terminate course? Effective Term/Year for Termination:

Faculty Contact/Email/Phone Hanqi Zhuang/zhuang@fau.edu/561-297-3413

Approved by		***Date***
Department Chair	Hanqi Zhuang — Digitally signed by Hanqi Zhuang Date: 2020.10.20 05:42:38 -04'00'	
College Curriculum Chair	Francisco Presuel-Moreno — Digitally signed by Francisco Presuel-Moreno DN: cn=Francisco Presuel-Moreno, o, ou, email=fpresuel@fau.edu, c=US Date: 2020.10.21 16:43:33 -04'00'	10/21/2020
College Dean	Digitally signed by Mihaela Cardei DN: cn=Mihaela Cardei, o=Florida Atlantic University, ou, email=mcardei@fau.edu, c=US Date: 2020.10.25 16:16:25 -04'00'	10/25/2020
UGPC Chair		
UGC Chair		
Graduate College Dean		
UFS President		
Provost		

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

Department of Computer and Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
BME 5000 Introduction to Biomedical Engineering	3
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: none	
3. Course logistics	
Term: Summer 2021 *Class location and time:* TBA	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Dr. Mirjana Pavlovic Engineering East (EE-96) Bldg., Room 515 TBA 561-297-2348 mpavlovi@fau.edu , pmirjana@aol.com
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	TBA
6. Course description	
Course provides a broad perspective of biomedical engineering as applied to topics in contemporary biology, physiology, and medicine, including biotechnology and bioinformatics.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	*During the course students will not only* learn and study particular topics, *but also* try to give the solutions to certain problems in order to develop their creativity and talents *for advanced, more complex, and independent integrative thinking and research. The ultimate purpose of the study is to elevate the knowledge on this already advanced in its development, complex, and highly progressing field of research. This would encourage students toward a modern, co-temporary integral approaches, by developing their own creative ideas in bio (*life science*)* medical *fields at both molecular, and integral physiological level ,involving them into particular, chosen thematic research fields and enable them to articulate their own ideas.* The students will be able 1. to understand the structure, topography of the cell and tissues/organs, and their function at molecular and cellular level in order to apply biomedical engineering solutions into life-

	science-biomedical fields of precisely targeted prevention, diagnosis, and therapy, based on integrative fundamental research concepts 2. to understand and apply basic biomedical engineering terminology and accept biological principles in integrative, comprehensive manner, "digging" into the roots, genesis and development of brilliant solutions (ideas) to bioengineering problems that could be inspiration for their own research studies 3. to bridge the gap between life science and biomedical engineering approaches by understanding how the two interfere, and how the biological principles can be used in computer-aided analysis, simulation, and control of selected physiological processes and biological systems.
Student learning outcomes & relationship to ABET 1-7 outcomes	

8. Course evaluation method

Home Work -	80%	
Group presentations -	20%	

9. Course grading scale

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."

10. Policy on makeup tests, late work, and incompletes

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements

Late work is acceptable, under special conditions.

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.

11. Special course requirements

Students have to perform their presentations once or twice within the semester, dependent on the number of students

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Attendance policy statement

Students are expected to attend all of 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.

14. Disability policy statement

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/.

15. 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/

16. Code of Academic Integrity policy statement

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 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. If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

17. Required texts/reading

To reduce costs for our students, we strongly encourage you to explore the adoption of open educational resources (OER), textbooks and other materials that are freely accessible. We also encourage you to clearly state in the syllabus if course materials are available on reserve in the Library.

None.
18. Supplementary/recommended readings
Mirjana Pavlovic :Bioengineering : A conceptual approach, Springer ,NY,2015
19. Course topical outline, including dates for exams/quizzes, papers, completion of reading
1.Examples of biological systems from bioengineering point of view : mathematical models important for understanding and supporting biological functions (skeleton, circulation) 2. Cell construction and housekeeping functions (concept of motor proteins) 3. The technology behind human genome project (computational approach to determination of the role of micro-RNA in diseases, Lab-on chip methodology for research and clinical practice) 4. Enzyme/Abzyme (antibody as a hydrolytic enzyme) and Receptor Function and Kinetics (computational modeling) 5.Function/physiology of vital organs 6. Stem cells and tissue engineering: principles of regenerative and organ replacement therapy 7. Diseases as the models for regenerative therapy (transplantation) 8. Drug delivery systems, including viral gene delivery 9. Artificial organs 10. Nanotechnology: nanorobot and nanobrain-concepts 11.Biomagnestism and Biophotonics (basics) ***Student Presentation # 2: April 20 /22, 2020*** **There is no exam for this course.**

BME 5000: Introduction to Biomedical engineering (Spring 2020) Calendar

Week/Lect	Date	Topics	Comments (Book)
1/1		**Introductory remarks**: An overview of biological basics, summary on biological modeling, ranges and perspectives on bioengineering ***(Chapter 1)***	***M. Pavlovic:Bioengineering: Conceptual approach, Springer, 2015*** ***W. Mark Saltzman:*** Biomedical Engineering, Bridging Medicine &Technology, **Cambridge University Press, 2009**
1/2		**Cell construction** : Biomolecules: macromolecules of life, molecular motors cells and their housekeeping functions ***(Chapter 2)***	
2/3		**Genomics**: The technology behind human genome project, nucleic acids, oncogenes and tumor suppressor genes, the role of micro-RNA in the disease ***(Chapter 3)***	
2/4		**Proteins**: Structural and Functional features Enzymes/Abzymes : role in the cells and tissues, elements of enzyme kinetics (***Dr Zvi Roth, PhD***) ***(Chapter 4 and 5)***	*Pavlovic/notes*

3/5		**Cell physiology**: Cell structure and function, ion transport, membrane potentials, receptor-mediating endocytosis, and signaling ***(Chapter 5)***	*Pavlovic/notes*
3/6		***Communication systems in the body I*** ***Neural system*** ***Signal processing : resting and action potentials in excitable tissues*** ***(Chapter 5 and 6)***	*Pavlovic/notes*
4/7 4/8		**Communication systems in the body II: Endocrine system:** Receptors-ligands (hormones) types, messengers, kinetics of binding, hormone signaling **Signal Transduction Pathways** (Basics) ***(Chapter 6)***	*Pavlovic/notes*
4/9		**Communication systems in the body III:** **Immune system** signaling and communication ***(Chapter 5)***	*Pavlovic,Saltzman/notes*
5/10		**Stem cells and tissue engineering** : Principles of regenerative therapy:-quantitative & -qualitative aspects ***(Chapter 5)***	*Pavlovic, Saltzman and papers/notes*
5/11		**Regenerative medicine vs. bioengineering** Where are the borderlines?	*Pavlovic,Papers/notes*
6/12		**Disease models for regenerative therapy** (Transplantation)	*Pavlovic,To be given during the time*
6/13		**Drug delivery systems :** Different models Elements of nanotechnology and Drug delivery designs	*Saltzman and papers*
7/14		**Engineering balances: Understanding the concepts of an engineering system, system boundaries, and differences between open and closed systems. Assumptions, predictions and models : mass, water, and tracer balance in the body, homeostasis, steady- state and equilibrium (Chapter 7)**	*Pavlovic,Saltzman and papers*
7/15		Respiration and digestion Anatomy and physiology (Chapter 7)	*Pavlovic,Saltzman/notes*
8/16		***Circulation*** ***Anatomy and physiology, blood pressure, viscosity, heart cycle, gas exchange*** ***(Chapter 8)*** ***Removal of molecules : glomerular filtration, reabsorption and secretion in tubules, biliar transformation and excretion*** ***(Chapter 9)***	*Pavlovic,Saltzman/notes*
9/0-0	**03/07-03/13**	**SPRING BREAK.NO CLASSES**	
10/18		***Biomechanics*** ***Mechanical properties of materials, elastic and plastic deformations Energy storage with deformation, Mechanical properties of particular tissues and organs,*** ***(Chapter 10*** ***Bioinstrumentation:*** ***Instruments in medical practice***	*Pavlovic,Saltzman/notes*

		Types of bio-sensors Chapter (10 and 11)	
10/19		***Student projects presentations***	*Pavlovic, Saltzman/notes*
11/20		Student project presentations	*Pavlovic,Saltzman/notes*
11/21		***Bioimaging*** ***Imaging and sensory systems as the part of bioengineering implicated in disease diagnostics and therapy*** ***(Chapter12***	
12/22		***Principles for designing replacement organs and tissues)***	
12/23 13/24 14/25		**Biomolecular engineering I** Tissue engineering strategies: artificial skin, nanotechnology (Chapter13) ***Biomolecular engineering II*** ***Principles of genetic engineering. Engineering of Immunity: Antigens, Antibodies, Vaccines: examples of vaccine developments (Guest: Ms. Sharmistha Catterjee, PhD)*** ***(Chapter 14)*** ***Biomaterials and artificial organs*** ***Biomaterials: biocompatibility, Artificial organs, Cell-based treatments for diabetes*** ***(Chapter 15)***	*Pavlovic,Saltzman/notes*
14/26		***Biomedical engineering and cancer*** ***Cancerogenesis, radiation therapy, chemotherapy, hormonal and biomodifying therapies, biomarkers, bioengineering treatment approaches and solutions*** ***(Chapter 16)***	*Pavlovic,Saltzman/notes*
14/27		***Cell division, Death and Dynamics of interacting cellular-fate processes ,*** ***Scaling up techniques for ex vivo cultivation and cell separation***	*Pavlovic,Saltzman/notes*
15/30	**Fr 04/20,22**	**Student projects**	
15/29	**M 04/25**		**Last day of classes**

Official University Holidays:
January 20 M.L.King Jr Holiday
March 7-15 Spring Break (No classes, offices open)

From: Marc Kantorow <MKANTORO@health.fau.edu>
Sent: Thursday, November 19, 2020 10:12 AM
To: Mihaela Cardei <mcardei@fau.edu>
Cc: Phillip Boiselle <pboiselle@health.fau.edu>; Janet Robishaw <jrobishaw@health.fau.edu>; Bridget Smith <BSTATLER@health.fau.edu>; Hanqi Zhuang <zhuang@fau.edu>
Subject: Re: Please help: Biomedical Engineering: Program and Course Title Changes

Hi Mihaela,

Thank you for the information and for giving our Graduate Strategic Planning Committee the time needed to evaluate the program changes. The Committee met yesterday and I am happy to report their support for your proposal. The Committee expressed their desire to continue to build on existing collaborations between COM and Engineering faculty and we look forward to a productive partnership.
Please don't hesitate to reach out if you have any questions or if there is anything we can do to help.
All the best,
Marc

Marc Kantorow PhD FARVO
Professor of Biomedical Science
Associate Dean for Graduate Programs
Charles E. Schmidt College of Medicine
Florida Atlantic University
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561-297-2910

From: Mihaela Cardei <mcardei@fau.edu>
Date: Monday, November 9, 2020 at 2:28 PM
To: Marc Kantorow <MKANTORO@health.fau.edu>
Cc: Janet Robishaw <jrobishaw@health.fau.edu>, Bridget Smith <BSTATLER@health.fau.edu>, Hanqi Zhuang <zhuang@fau.edu>
Subject: Re: Please help: Biomedical Engineering: Program and Course Title Changes

Hi Marc,

Thank you for the update. I have sent you previously the link to the current program (http://www.ceecs.fau.edu/graduate/ms/bioengineering/index.php), and I wanted to mention that if you check the Program Worksheet (http://www.ceecs.fau.edu/graduate/ms/bioengineering/pdf/ms_worksheet-bioeng.pdf), you can see the variety of elective courses including courses from College of Medicine and College of Science.

If the committee needs any additional information, please let me know.

Best regards,
Mihaela

From: Marc Kantorow <MKANTORO@health.fau.edu>
Sent: Monday, November 9, 2020 12:44 PM
To: Mihaela Cardei <mcardei@fau.edu>
Cc: Janet Robishaw <jrobishaw@health.fau.edu>; Bridget Smith <BSTATLER@health.fau.edu>
Subject: Re: Please help: Biomedical Engineering: Program and Course Title Changes

Hi Mihaela,
Just wanted to update you that our committee will be reviewing the materials and will be meeting soon to discuss.
Please let me know if you have any questions.
All the best,
Marc

Marc Kantorow PhD FARVO
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From: Mihaela Cardei <mcardei@fau.edu>
Date: Thursday, November 5, 2020 at 11:57 AM
To: Marc Kantorow <MKANTORO@health.fau.edu>
Cc: Janet Robishaw <jrobishaw@health.fau.edu>, Bridget Smith <BSTATLER@health.fau.edu>, Hanqi Zhuang <zhuang@fau.edu>
Subject: Re: Please help: Biomedical Engineering: Program and Course Title Changes

Hello Marc,

Thank you for your prompt reply. All the material is already included in the email below, please click on the links. If you need additional information, please be specific and we will get back to you as soon as possible.

thank you,
Mihaela