



 FLORIDA ATLANTIC UNIVERSITY	COURSE CHANGE REQUEST Graduate Programs		UGPC Approval _____ UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner _____ Catalog _____
	Department Computer and Electrical Eng and Comp Science College Engineering and Computer Science		
Current Course Prefix and Number BME 6762	Current Course Title Bioinformatics: Bioengineering Perspectives		
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: Bioinformatics: Biomedical Perspectives Change prefix From: _____ To: _____ Change course number From: _____ To: _____ Change credits* From: _____ To: _____ Change grading From: _____ To: _____ Academic Service Learning (ASL) ** Add <input type="checkbox"/> Remove <input type="checkbox"/>	Change description to: Introduction to bioinformatics - Bioinformatics-definition and applications. Concepts and definitions of molecular biological terms: Genomics and Proteomics. Biological sequence analysis and Next-generation sequencing. Translational and clinical bioinformatics. Viral bioinformatics and rational vaccine designs. Cytogenetic and phylogenetic informatics. Sequence search/analyses tools and protocols. Information resources: Databases and networks. Change prerequisites/minimum grades to: 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 Department Chair _____ Hanqi Zhuang College Curriculum Chair _____ Francisco Presuel-Moreno College Dean _____  UGPC Chair _____  UGC Chair _____  Graduate College Dean _____  UFS President _____ Provost _____	Digitally signed by Hanqi Zhuang Date: 2020.10.20 05:45:06 -04'00' Digitally signed by Francisco Presuel-Moreno DN: cn=Francisco Presuel-Moreno, o=fau, email=fpresuel@fau.edu, c=US Date: 2020.10.21 16:44:43 -04'00' <small>Digitally signed by M. Cardelino DN: cn=M. Cardelino, o=Florida Atlantic University, ou email=mc@fau.edu, c=US Date: 2020.10.20 16:06:00</small>	Date _____ _____ 10/25/2020 Dec 18, 2020 Dec 18, 2020 Dec 18, 2020 _____ _____	

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

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Course Syllabus**

1. Course title/number, number of credit hours	
BME 6762 Bioinformatics: Biomedical Perspectives	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: Engineering/Science B.S. degree	
3. Course logistics	
Term:	TBA
Days & Time:	TBA
Class location and time:	TBA
4. Instructor contact information	
<i>Instructor's name</i>	Dr. Perambur S. Neelakantaswamy
<i>Office address</i>	(EE-96) Bldg., Room 517
<i>Office Hours</i>	TBA
<i>Contact telephone number</i>	561 297 3469
<i>Email address</i>	neelakan@fau.edu
5. TA contact information	
<i>TA's name</i>	TBA
<i>Office address</i>	
<i>Office Hours</i>	
<i>Contact telephone number</i>	
<i>Email address</i>	
6. Course description	
Introduction to bioinformatics - Bioinformatics-definition and applications. Concepts and definitions of molecular biological terms: Genomics and Proteomics. Biological sequence analysis and Next-generation sequencing. Translational and clinical bioinformatics. Viral bioinformatics and rational vaccine designs. Cytogenetic and phylogenetic informatics. Sequence search/analyses tools and protocols. Information resources: Databases and networks.	
7. Course objectives/student learning outcomes/program outcomes	
<i>Course objectives</i>	This course is intended to impart the concepts and practical aspects of bioinformatics. Relevant biological considerations and computational aspects are bridged. Analyses of biological (genomic and proteomic) sequences will be indicated. Computational exercises are given as a term project on individual basis.
<i>Student learning outcomes & relationship to ABET 1-7 outcomes</i>	
8. Course evaluation method	
Broad-based assignments: 80% weighted by 4 units of submissions	

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Projects (Individual): **20%**
HW & Project exercises will be posted on CANVAS. **Policy on Open-book Testing:**

- 1. NOTE: This course does NOT have closed- book tests (All assignments as above are open book types). As such “NO Attendance is required.” for this fully on-line distance-Learning class**
- 2. “All questions will be sent publicly through Canvas,”. Tests will be exercised thereof via CANVAS only**

9. Course grading scale

A= 90-100%, A-=85-89%, B+=80-84%, B=75-79%, B- =70-74%, C+=65-69%, C=60-64%, C-=55-59%, D+=50-54%, D=45-49%, D-=40-44%, F=0-39%.

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

Incomplete grades are not in general favored as a policy of the department. Unless there is a solid evidence of medical condition/jury-duty or otherwise serious emergency/family situation incomplete grades will not be given.

11. Special course requirements

Background of computational skill: Use of MatLab™ and /or C/C++ preferred & pSPICE learning encouraged

12. Classroom etiquette policy

Distance-learning needs diligently following the video-streaming at Canvas. This University policy is required to enhance and maintain a productive atmosphere for education

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 from the tests 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 test- absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for such 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

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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

Ref Text-books: 1. T. K. Attwood & D. J. Parry-Smith: *Introduction to Bioinformatics* (Prentice-Hall/Pearson Education Ltd.). ISBN 0582 327881
 2. B. Bergeron: *Bioinformatics Computing* (Prentice-Hall/Pearson Education Ltd.).
 3. Possibly, the Instructor-authored book will be indicated late

18. Supplementary/recommended readings

Lecture Notes (in Units) will be made available on CANVAS periodically.

19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Topics:

BIOINFORMATICS – AN INTRODUCTION: CONCEPTS AND DEFINITIONS OF MOLECULAR BIOLOGICAL TERMS IN GENOMICS & PROTEOMIC CONTEXTS

Bioinformatics is outlined as a scientific discipline representing the combined strength of biology, mathematics, information science and computational techniques. Its objective to provide tools and methods to comprehend and analyze the enormous amount of data being generated by researchers identifying the lengthy DNA sequences of humans, plants, animals and microorganisms is described. Explanatory pedagogy plus exploratory background on information-theoretic coupled with computational strategies that expose and unveiling the life's blueprints of the central dogma of microbiology towards detailing the underlying biological data at genomic and proteomic levels are presented.

BIOMOLECULAR INFORMATICS: PAIRWISE AND MULTIPLE BIOMOLECULAR SEQUENCES AND NEXT-GENERATION SEQUENCING (NGS)

Developing analytics on meaningful alignment of pairwise and multiple biosequences and formulating dynamic-programming schemes towards thematic on scoring the integrity of alignments performed are outlined; and, devising methods to compare pair- and/or multiple-biosequences plus investigating specific biomolecular sequence details via high-throughput sequencing (HTS) schemes, (also known as next-generation sequencing or NGS) are focused. Needleman-Wunsch (NW) and Smith-Waterman algorithms on sequence alignment procedures of amino-acid open reading frames (ORF) of expressed tags are described.

BIOINFORMATIC RESOURCES: DATABASES, INFORMATION NETWORKS AND TOOLS

The global sets of databases improvised worldwide to store and disseminate the exhaustive bioinformatic data generated are identified; and, disseminating details via modern information

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networking enables global sharing of such data as needed in the contexts of bioinformatic studies (where computational tools are prescribed towards analyzing the data and related datamining efforts) are described. Conceiving large databases to hold analysis packages tools and, web-site details on microbial genomes are outlined.

TRANSLATIONAL AND CLINICAL BIOINFORMATICS

Translating the details of microbiological informatics for applications in patient-related bed-side contexts and developing exclusive clinical bioinformatic methods as an offshoot strategy of translational bioinformatics are presented. The analytical and computational methods thereof are pertinent to concepts of microbiology and notions of omics in biosequences. They are expanded further to address the so-called translational research informatics (TRI) and stretched farther into the pedagogy of clinical bioinformatics.

**INFORMATIC ASPECTS OF CYTOGENETICS: CELLULAR AND CHROMOSOMAL SYNTENY
BIOINFORMATICS**

Understanding the intricacies of cellular details and develop an exclusive art of cytogenetic bioinformatics at cellular level are focused. Relevant cytogenetic bioinformatics refers to an organelle level, chromosomal informatics of the cellular complex. It conforms to rearrangements of chromosomal entities vis-à-vis informative aspects of the states of genetic order (and disorder) implied by stochastic framework of normal and abnormal cellular constituents at cytogenetic/organelle level.

BIOINFORMATICS OF VIRAL OMICS: RATIONAL VACCINE DESIGNS (RVD)

With reference to viral species, the associated bioinformatics implies assessing the omic characteristics of viral biosequences. Relevant thematic efforts yield results that could enable identifying (for example, the motifs of a viral serovar set) useful in rational vaccine designs (RVD). Pertinent omic informatics of viral landscape is conceived to include the in silico aspects of vaccine design algorithms (based on entropic, energetics and Fourier domain considerations) compatible for programming. Example designs are presented.

PHYLOGENETICS AND SPECIES INFORMATICS: EVOLUTION-THEORETICS AND PHYLOGENY

Expanding evolutionary-theoretics, phylogenetic bioinformatic studies are indicated with big-data analyses via advanced computational methods. Relying on classical and modern views of evolution theory, phylogenetic concepts and related analyses are conceived. The underlying heuristics and methods of (re)constructing phylogenetic trees are detailed. Narrations explaining the informatics of phylogeny and related hierarchical elaborations on gene-to-species evolution are presented.

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
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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

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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

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