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 6762	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 ☐ **Remove** ☐

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

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:	**Terminate course? Effective Term/Year for Termination:**
Spring 2021	

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 05:45:06 -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 16:44:43 -04'00'	
College Dean	MCardei — Digitally signed by Mihaela Cardei DN: cn=Mihaela Cardei, o=Florida Atlantic University, ou, email=mcardei@fau.edu, c=US Date: 2020.10.25 16:39:06 -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 & Electrical Engineering and Computer Science
Florida Atlantic University
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	
Instructor's name *Office address* *Office Hours* *Contact telephone number* *Email address*	Dr. Perambur S. Neelakantaswamy (EE-96) Bldg., Room 517 TBA 561 297 3469 neelakan@fau.edu
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	TBA
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	
Course objectives	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.
Student learning outcomes & relationship to ABET 1-7 outcomes	
8. Course evaluation method	
Broad-based assignments: **80%** weighted by 4 units of submissions	

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

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 thematics 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

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.