

# FLORIDA ATLANTIC UNIVERSITY™

## Graduate Programs—NEW COURSE PROPOSAL

UGPC APPROVAL \_\_\_\_\_  
 UFS APPROVAL \_\_\_\_\_  
 SCNS SUBMITTAL \_\_\_\_\_  
 CONFIRMED \_\_\_\_\_  
 BANNER POSTED \_\_\_\_\_  
 CATALOG \_\_\_\_\_

DEPARTMENT BIOMEDICAL SCIENCE

COLLEGE MEDICINE

RECOMMENDED COURSE IDENTIFICATION (TO OBTAIN A COURSE NUMBER, CONTACT [ERUDOLPH@FAU.EDU](mailto:ERUDOLPH@FAU.EDU))

PREFIX PCB COURSE NUMBER 6088 LAB CODE (IF APPROPRIATE L OR C)  
 L = LAB COURSE; C = COMBINED LECTURE/LAB

COMPLETE COURSE TITLE: BIOMEDICAL DATA AND INFORMATICS

### EFFECTIVE DATE

(first term course will be offered)

     SPRING 2017

CREDITS<sup>2</sup>  
3

TEXTBOOK INFORMATION:

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR   X   SATISFACTORY/UNSATISFACTORY \_\_\_\_\_

COURSE DESCRIPTION, NO MORE THAN THREE LINES:

THE COURSE TEACHES ESSENTIAL CONCEPTS AND METHODOLOGY FOR BIOMEDICAL DATA ACQUISITION AND ANALYSIS, WITH AN EMPHASIS IN ANALYSIS OF MASSIVE DATA. THE COURSE SETS UP THE FOUNDATION FOR STUDENTS' CAREER IN BIOMEDICAL INFORMATICS IN A WIDE RANGE OF FIELDS INCLUDING BIOMEDICAL ACADEMIA, PHARMACEUTICAL AND BIOTECHNOLOGY INDUSTRIES.

PREREQUISITES\* NONE

COREQUISITES\* NONE

REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)\*  
INSTRUCTOR PERMISSION REQUIRED

\* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:

MEMBER OF THE GRADUATE FACULTY OF FAU AND HAS A TERMINAL DEGREE IN THE SUBJECT AREA (OR A CLOSELY RELATED FIELD).

Faculty contact, email and complete phone number:

Dr. Dr. Zhongwei Li  
(561) 297-3178 [zli@health.fau.edu](mailto:zli@health.fau.edu)

Please consult and list departments that might be affected by the new course and attach comments.<sup>3</sup>

Biology Dept. comments  
attached

Approved by:

Department Chair: \_\_\_\_\_

College Curriculum Chair: \_\_\_\_\_

College Dean: \_\_\_\_\_

UGPC Chair: \_\_\_\_\_

Graduate College Dean: \_\_\_\_\_

UFS President: \_\_\_\_\_

Provost: \_\_\_\_\_

Date:

10/3/16

10/4/16

1. Syllabus must be attached; see guidelines for requirements: [www.fau.edu/provost/files/course\\_syllabus.2011.pdf](http://www.fau.edu/provost/files/course_syllabus.2011.pdf)

2. Review Provost Memorandum: Definition of a Credit Hour [www.fau.edu/provost/files/Definition\\_Credit\\_Hour\\_Memo\\_2012.pdf](http://www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf)

3. Consent from affected departments (attach if necessary)

Email this form and syllabus to [UGPC@fau.edu](mailto:UGPC@fau.edu) one week before the University Graduate Programs Committee meeting.

## BIOMEDICAL DATA AND INFORMATICS

**Course Number:** PCB 6088

**Credits:** 3

**Prerequisite:** permission of course instructor - given to those with adequate prior experience/course work in statistics, programming and data structure.

**Co-requisite:** None

**Location:** TBD. Time TR 3:30pm-4:50pm.

**Instructor:**

Dr. Zhongwei Li

BC-71 #308

(561) 297-3178

[zli@health.fau.edu](mailto:zli@health.fau.edu)

**Course Description:**

Goal: to advocate and prepare students for careers in biomedical science by providing them the core foundation in biomedical experimental design and data management.

1. The course teaches essential concepts and methodology for biomedical data acquisition and analysis, with an emphasis in analysis of massive data.
2. The course prepares students in carrying out biomedical research.
3. The course sets up the foundation for students' career in biomedical informatics in a wide range of fields including biomedical academia, pharmaceutical and biotechnology industries.

The nature, organization, acquisition, computation and statistical analysis, and interpretation of biomedical data from molecular and cellular, genomic, physiological and clinical studies will be explored.

**Course objectives/student learning outcomes**

**Instructional objectives:**

After taking this course, the students are expected be familiar with the nature and types of biomedical data that are statistically meaningful. The students will gain up-to-date knowledge on how biomedical data are acquired based on hypothesis-driven experimentation. The students will master essential methodologies to analyze biomedical data and interpret the results in relation to health status and to disease-treatment efficacy. The students are expected to learn (1) Biomedical data, variation, database; (2) Fundamental statistics concepts and methods, biomedical data distribution, confidence, significance tests, ANOVA test; (3) Hypothesis-driven "wet-lab", genomic and clinical experimentations, data collection and interpretation; (4) computation of biomedical data, mining of genomic sequence and expression data, clinical studies and data analysis. Students who successfully complete the course work will be prepared to acquire, assess and analyze modern biomedical data at advanced levels.

### Recommended textbook:

No textbook is required. The instructor will provide sufficient lecture materials in the form of powerpoint presentations, reading materials or handouts etc., which may require reading prior to class meeting and discussion in class.

### Recommended additional reading materials:

Andreas Holzinger (Author) Biomedical Informatics: Discovering Knowledge in Big Data (Springer) ISBN-13: 978-3319045276 ISBN-10: 331904527X Edition: 2014<sup>th</sup>.

Maglott D, Barrett T, Murphy T, et al. Genes and Gene Expression. The NCBI Handbook [Internet]. 2nd edition. Bethesda (MD): National Center for Biotechnology Information (US); 2013-. (<http://www.ncbi.nlm.nih.gov/books/NBK169829/>)

Brown TA. Genomes. 2nd edition. Oxford: Wiley-Liss; 2002. (<http://www.ncbi.nlm.nih.gov/books/NBK21128/>)

Perez-Diez A, Morgun A, Shulzhenko N. Microarrays for Cancer Diagnosis and Classification. In Madame Curie Bioscience Database [Internet]. Austin (TX): Landes Bioscience; 2000-. (<http://www.ncbi.nlm.nih.gov/books/NBK6624/>)

Eija Korpelainen (Author) RNA-seq Data Analysis: A Practical Approach (Chapman & Hall/CRC Mathematical and Computational Biology) Print ISBN-10: 1466595000; Print ISBN-13: 978-1466595002

### Project assignments:

Each student will be assigned a project that requires the student to work outside the classroom, including reading relevant materials of the project, learning methods and obtaining data, carrying out analysis and writing a report based on analysis results. Each student will present the project in class followed by discussions.

### Assessment:

Exams 60 points

Midterm and final written exams will be given and will count for 30 points each.

Project/Participation 40 points

Each student will submit a written project design which will count for 20 points. Each student will have a presentation of the project and the presentation will count for 20 points.

Reading Comprehension 0 points.

To assist students improve reading comprehension skills, some lectures will include a brief in class reading assignment. This activity is being "Beta tested" and will not be graded.

Total 100 points

### Course Schedule

<i>Week</i>	<i>Topic</i>
1	Introduction and overview of biomedical science
2	Molecular Basis of human diseases
3	Acquisition of biomedical and diseases data
4	Biomedical data and database
5	Data distribution, confidence interval and tests
6	Experimental design
7	Midterm Exam
8	Clinical studies
9	Data retrieval and interpretation
10	Genomic data mining
11	Clinical data analysis
12	Computation of biomedical data
13	Project presentation
14	Project presentation
15	Review and final exam

**Grading Criteria:**

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
F	<70

**Make-up tests and assignments:**

Only absences that meet FAU criteria will be considered.

**Extra Credit:**

None.

**Attendance Policy:**

Attendance is required. 1 point will be deducted from final grade for each absence, except those excused by FAU policy. One additional absence may be excused.

**Electronic Devices:**

No electronic devices may be used during class or exams without permission of instructor. Disruptions to class, including those caused by cell phones or other electronic devices, may be reflected in the grade.

**Academic Honor Code:**

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.

The FAU Honor Code requires a faculty member, student, or staff member to notify an instructor when there is reason to believe an academic irregularity is occurring in a course. The instructor must pursue any reasonable allegation, taking action where appropriate. The following constitute academic irregularities:

1. The use of notes, books or assistance from or to other students while taking an examination or working on other assignments, unless specifically authorized by the instructor, are defined as acts of cheating.
2. The presentation of words or ideas from any other source as one's own is an act defined as plagiarism.
3. Other activities that interfere with the educational mission of the University.

For full details of the FAU Honor Code, see University Regulation 4.001 at [www.fau.edu/regulations/chapter4/4.001\\_Honor\\_Code.pdf](http://www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf).

**Students With Disabilities**

In compliance with the American Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) – in Boca Raton, SU 133 (561-297-3880); in Davie, MOD 1 (954-236-1222); in Jupiter, SR 117 (561-799-8585); or at the Treasure Coast, CO 128 (772-873-3305) – and follow all OSD procedures.

**From:** [Ramaswamy Narayanan](#)  
**To:** [Bridget Statler](#)  
**Cc:** [William Brooks](#); [Michelle Cavallo](#); [Marc Kantorow](#); [Sarah Milton](#)  
**Subject:** Re: Graduate Program New Course Proposal form to add course Biomedical Data and Informatics course in the Master of Science of Biomedical Science Degree Program  
**Date:** Wednesday, October 05, 2016 8:40:29 AM  
**Attachments:** [image001.png](#)

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This proposed new course on Biomedical Data and Informatics course complements Biology's Bioinformatics program. This would add value to the graduate programs across Biology and Medicine. I support this.

Narayanan

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Dr. Ramaswamy Narayanan,  
Professor, Biology SC 216  
Florida Atlantic University  
777, Glades Road, Boca Raton, FL 33431  
<http://biology.fau.edu/directory/narayanan/index.php>

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**From:** Bridget Statler <[BSTATLER@health.fau.edu](mailto:BSTATLER@health.fau.edu)>  
**Date:** Tuesday, October 4, 2016 at 1:55 PM  
**To:** Ramaswamy Narayanan <[rnarayan@fau.edu](mailto:rnarayan@fau.edu)>  
**Cc:** William Brooks <[wbrooks@fau.edu](mailto:wbrooks@fau.edu)>, Michelle Cavallo <[MCAVALLO@fau.edu](mailto:MCAVALLO@fau.edu)>, Marc Kantorow <[MKANTORO@health.fau.edu](mailto:MKANTORO@health.fau.edu)>  
**Subject:** Graduate Program New Course Proposal form to add course Biomedical Data and Informatics course in the Master of Science of Biomedical Science Degree Program

Dear Dr. Narayanan,

Please find attached the Graduate Program New Course Proposal form to add course Biomedical Data and Informatics course in the Master of Science of Biomedical Science Degree Program.

Under the "Consult and list departments that might be affected by the change and attach comments" box, we are including the Biology Department.

Kindly send a letter of support or an email with your comments by **October 12th, 2016**.

Thank you very much for your time and attention.

Regards,

Bridget Statler, M. Ed.  
Graduate Programs Coordinator  
Charles E. Schmidt College of Medicine

Florida Atlantic University  
777 Glades Road,  
Boca Raton, FL 33431  
BC 71, Room 206 A  
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