JARVIS CHRISTIAN UNIVERSITY
HAWKINS, TEXAS
Semester: Spring 2024

Course Number: MATH 3390
Course Name: Computational and Mathematical Biology
Instructor: Dr. Widodo Samyono
Term: 2023-2024 Academic Year **Spring**
Time of Class: Tue-Thu: 3:00 – 4:20 PM CT.
Classroom Location: Zoom and Meyer/M-14

Office Location: Meyer/M-14	Office Hours
Extension: 4028	**TBA**
Jarvis Email: wsamyono@jarvis.edu	
Alternate Email: wsamyono@gmail.com	

I. COURSE DESCRIPTION
1. Description: In some cases, it is too dangerous or impossible to do an experiment, so we can do numerical experiments through mathematical modeling and simulation. Besides learning mathematical modeling, the students in this course will learn basic commands, syntaxes, and fundamental programming in Python and use them for solving problems in biology. The course targets students having major in mathematics, and biology and chemistry with minor in mathematics who are interested in learning computational and mathematical biology. The course consists of 3 parts: 1) fundamental programming in Python, 2) computational biology, and 3) mathematical biology.
2. Prerequisites: Introduction to a computer course.
3. Corequisites:

II. COURSE INSTRUCTIONAL GOALS:
The goals of this course include introducing the students to mathematical modeling and simulation for solving problems in Biology, exposing the students to computational and mathematical biology, and to solve real-life problems in biology using computational and applied mathematics.

III. STUDENT LEARNING EXPECTED OUTCOMES/COMPETENCIES:
After completing this course, students will be able to:
1) Mastering how to do mathematical modeling for problems in biology,
2) Mastering how to use Python commands and syntaxes in mathematical modeling and simulation for problems in biology,
3) Mastering common usage of numerical methods to solve problems in biology,
4) Mastering working on individual and collaborative projects to solve problems in biology.

Student Responsibility: Typically, for a student to excel in college, he/she should put in at least two hours outside of class (or more, if necessary) for each hour spent in the classroom.

IV. METHODS OF INSTRUCTION:
Lectures, audio-visual equipment, computer equipment, graphing calculators, JCC Web, quizzes, homework, exams, models, charts, and graphs, etc.

V. COURSE CONTENT
A. **Required Materials (NAME OF BOOK WITH ISBN NUMBER) if applicable.**
1) **An Introduction to Programming for Bioscientists: A Python-Based Primer.**
   https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1004867
2) **Basic concepts of mathematical modeling with Python. https://assb.lri.fr/en/Abstracts/Oliver_Ebenhoeh.html**
3) **Systems biology modeling in Python. http://pysb.org/**

B. Weekly Outline (01/08/2024 – 05/04/2024)

Week	Chapters/Topics/Assignments	Learning Outcome
1	Motivation: Big Data and Biology	1
2	Fundamentals of Programming	2
3	Fundamentals of Programming (Continued)	2
4	Data Collections: Tuples, Lists, For Loops, and Dictionaries	2
5	Data Collections: Tuples, Lists, For Loops, and Dictionaries (Continued)	2
6	Object-Oriented Programming in Nutshell: Classes, Objects, Methods, and All That	2
7	Object-Oriented Programming in Nutshell: Classes, Objects, Methods, and All That (Continued)	2
8	File Management and I/O	2
9	File Management and I/O (Continued)	2
10	Regular Expressions for String Manipulations	2
11	Regular Expressions for String Manipulations (Continued)	2
12	An Advanced Vignette: Creating Graphical User Interface with Tkinter	2
13	An Advanced Vignette: Creating Graphical User Interface with Tkinter (Continued)	2
14	Numerical Methods to solve ODEs and Optimization for Biological Systems	3
15	Final Project	4

VI. COURSE EVALUATION

A. GRADING SYSTEM
Letter grades will be awarded according to the following scale: A=90% and above, B=80%-89%, C=70%-79%, D=60%-69%, F=59% and below.

B. GRADING DETAILS

Assignment Category	Percentage
Programming Homework	45%
Exams	35%
Final Project	20%
Total	**100%**

VII. IMPORTANT DATES TO REMEMBER:
Add/Drop period (change of schedule) ends:
Last date to withdraw with a grade of "W":
Final Examination date and time:

VIII. CLASSROOM POLICIES

A. Attendance:
Students are expected to attend all meetings of their classes at Jarvis Christian College, to arrive at the designated beginning time for the class, and to remain until the designated dismissal time for the class. In any course offered during the fall or spring semester, faculty are authorized by Jarvis Christian College policy to fail or to recommend that students withdraw students whose total absences exceed the limit set forth by the College. Students must withdraw from class by the assigned date or receive an "F" for the course. No more than six (6) absences are acceptable in a class meeting three times a week; no more than four (4) absences are acceptable in a class meeting two times a week; and no more than two (2) absences are acceptable in a class meeting once a week. Specific standards for a summer course are stated in the syllabus.

B.   **Absences:**
Unauthorized absences on dates published for examinations result in loss of those examination grades. All **unauthorized** absences and instances of tardiness are subject to the penalty published **elsewhere** in the course syllabus.

C.   **Tardiness:**

D.   **Make-up Work/Late Work:**

E.   **Electronic Devices:**
Cell phones must be turned off and put away during class time.

F.   **Academic Integrity:**
The value of an academic degree is contingent upon the integrity of the work performed by the student for a degree. It is imperative that students be responsible for maintaining high standards of individual honor in scholastic work as indicated in Jarvis Christian College's Academic Integrity policy (http://www.jarvis.edu/Academics/OfficeofAcademicAffairs/AcademicIntegrity/tabid/273/Default.aspx).

G.   **Accommodation Statement:** Jarvis Christian College is committed to both the spirit and letter of federal equal opportunity legislation (reference Public Law 92-112-The Rehabilitation Act of 1973 as amended). With the passage of the federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is a renewed focus on providing this population with the same opportunities enjoyed by all citizens.

The college is required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels.

Any student in the class who has a disability that may prevent full demonstration of ability should contact the instructor personally before the end of the first week of classes so that a discussion can be held regarding accommodations necessary to ensure full participation and facilitate individual educational opportunities.

H.   **Classroom Decorum:**
Each student upon enrollment at Jarvis Christian College assumes an obligation to conduct themselves at all times in a manner appropriate for a college student. Student must obey all college rules and regulations; show proper respect to his/her instructors, other college authorities, and to his/her fellow students; and perform his/her duties as a student with diligence, fidelity, and honor. The college reserves the right to set general standards for enrolled students, participation in college activities, class attendance, or use of the library and other college facilities.