FLORIDA ATLANTIC UNIVERSITY

COURSE CHANGE REQUEST
Undergraduate Programs

Department Mathematics and Statistics

College Science

UUPC Approval 1/29/24
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

***Current* Course Prefix and Number**	***Current* Course Title**
MAP 4103	Applied Mathematical Modeling

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

Change title to:

Change prefix

From: **To:**

Change course number

From: **To:**

Change credits*

From: **To:**

Change grading

From: **To:**

Change WAC/Gordon Rule status**

Add ☐ **Remove** ☐

Change General Education Requirements***

Add ☐ **Remove** ☐

*See Definition of a Credit Hour.

**WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to this form. See WAC Guidelines.

***GE criteria must be indicated in syllabus and approval attached to this form. See Intellectual Foundations Guidelines.

Change description to:

Change prerequisites/minimum grades to:
MAP 2492 or ([MAP 2302 or MAP 3305] and [MAS 2103 or MAC 2313]) with a minimum grade of "C"

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade (default is D-).

Effective Term/Year for Changes:	**Terminate course? Effective Term/Year for Termination:**
Fall 2024	

Faculty Contact/Email/Phone Yuan Wang / ywang@fau.edu / (561) 297 2672

Approved by	***Date***
Department Chair yuan	01/15/2024
College Curriculum Chair	01/19/24
College Dean	1/19/24
UUPC Chair Korey Sorge	1/29/24
Undergraduate Studies Dean Dan Mesroff	1/29/24
UFS President	
Provost	

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

Syllabus: MAP 4103 Applied Mathematical Modeling (3 credits)

Course Description. This course covers the use of differential and difference equations in scientific modeling. Emphasis is on the "modeling" cycle with undergraduate research and inquiry (URI) components.

Prerequisites Minimum Grade of C in MAP 2492 or ([MAP 2302 or MAP 3305] and [MAS 2103 or MAC 2313])

Classroom and Class Time: AAA and BBB

Textbook: A Course in Mathematical Modeling by D. Mooney and R. Swift, published by the Mathematical Association of America, 1999.

Course Objectives and Student Learning Outcomes

This course will cover the use of differential and difference equations in scientific modeling. Techniques for the analysis of such equations both analytically and computationally will be the primary content knowledge. The course will also focus on the modeling cycle: describe a process, propose a model, select tools for analysis, find and analyze solutions, improve the model, and repeat. This will be done in the context of idealized models. This URI portion of the course will include at least one smaller assignment and one larger final project and will address Student Learning Objectives in Knowledge (1), Formulation of Questions (2), and Critical Thinking (4).

Upon the completion of the course, the students are expected to develop the ability to translate a description of an infectious disease into a mathematical model, use necessary mathematical tools to analyze the model, work with data sets collected from CDC, WHO, or the literature to gain insight of the current situation of the disease, enhance their skills in using computer software (MATLAB) to work with data sets and simulation of mathematical models. Students from other disciplines will also benefit from this course as well. The following references will be used to prepare the lecture notes.

References:

1. An Introduction to Mathematical Epidemiology by Maia Marthcheva, Springer, 2015.
2. Mathematical Epidemiology of Infectious Diseases, Model Building, Analysis and Interpretation by O. Dieckmann and J.A.P. Heesterbeek, Wiley, 2000.
3. Mathematical Models in Population Biology and Epidemiology by Carlos Castillo-Chaves and Fred Bauer, Springer, 2012.
4. Mathematical Biology by Mark A. Lewis, Mark A. J. Chaplain, James P. Keener, and Philip K. Maini, American Mathematical Society, 2009.
5. Mathematical Biology I: An Introduction by J.D. Murray, Springer, 2002.
6. Nonlinear Dynamics and Chaos by Steven H. Strogatz, CRC, 2000.

Topical outline:

- Week 1 Discrete dynamical systems and difference equations
- Week 2 Discrete stochasticity
- Week 3 Stages, states, and classes
- Week 4 Modeling cycle
- Week 5 Exam 1

- Week 6 Fitting models to data
- Week 7 Midterm project report
- Week 8 Fitting models to data 2
- Week 9 Exam 2
- Week 10 Differential equation models
- Week 11 Geometric analysis of differential equations
- Week 12 Parameter dependence and bifurcation
- Week 13 Final report
- Weeks 14 & 15 Final presentation

Course grade: Course grades will be determined by

Class Attendance and Participation: 10%
Exam 1: 15%
Exam 2: 15%
Midterm Project: 25%
Final Project: 35%

Grading scale:

> 94	A
90 – 93	A−
87 – 89	B+
84 – 86	B
80 – 83	B−
77 – 79	C+
74 – 76	C
70 – 73	C−
67 – 69	D+
64 – 66	D
61 – 63	D−
< 60	F

Incomplete grades:
A grade of I (incomplete) will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU University Catalog. The student has to show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

Faculty Rights and Responsibilities.
Florida Atlantic University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise. To ensure these rights, faculty members have the prerogative to:

- Establish and implement academic standards.
- Establish and enforce reasonable behavior standards in each class.
- Recommend disciplinary action for students whose behavior may be judged as disruptive under the Student Code of Conduct University Regulation 4.007.

Disability Policy. 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/.

Code of Academic Integrity. 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's 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. On exams, all work must be individual, with no electronic devices, no texts, no notes. In class, except on exam days, there may be group work, students may usually use their notes and texts. Please expect academic irregularities to be reported via the 4.001 process.

Attendance Policy Statement. Students are expected to attend all their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences on grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of nonattendance.

Students are responsible for arranging to make up work missed because of legitimate class absences, 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.

If you don't come to class, you miss an important part of the learning process. You also deprive other students of your input and ideas. Non-attendance may cause a forfeiture of the 10% allotted for class participation and homework.

Religious Accommodation Policy Statement. In accordance with the rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. University Regulation 2.007, Religious Observances, sets forth this policy for FAU and may be accessed on the FAU website at www.fau.edu/regulations. Any student who feels aggrieved regarding religious accommodations may present a grievance to the director of Equal Opportunity Programs. Any such grievances will follow Florida Atlantic University's established grievance procedure regarding alleged discrimination.

Time Commitment Per Credit Hour. For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

Grade Appeal Process. You may request a review of the final course grade when you believe that one of the following conditions apply:

- There was a computational or recording error in the grading.
- The grading process used non-academic criteria.
- There was a gross violation of the instructor's own grading system.

Policy on Make-up Tests, Late Work, and Incompletes. Students are expected to be in class, every class. However, if a student has an excuse that is listed in the catalog as an acceptable reason for having missed a class, accommodations will be made. The missed exam will be of approximately the same difficulty as that given to the rest of the class, but may not be of exactly the same difficulty.

An incomplete grade, "I", will only be given if requested at a time when the student is passing the course. Incomplete grades must be completed within a short time span after the class ends.

Homework to be submitted (usually once a week) needs to be submitted on time. Being late once won't be held against the student, but multiple late homework submissions will result in a lower grade in the homework and participation section. It is important that students attempt homework problems and exercises from the text on their own. Copying from other sources will not generally help you learn how to do your own proofs. If you had any help on submitted work, your submission should clearly state what help you received, and from whom.

Policy on the Recording of Lectures. Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

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/

Student Support Services and Online Resources (links will appear in Simple syllabus version)

Center for Learning and Student Success (CLASS)
Counseling and Psychological Services (CAPS)
FAU Libraries
Math Learning Center
Office of Information Technology Helpdesk
Office of International Programs and Study Abroad

Office of Undergraduate Research and Inquiry (OURI)
Science Learning Center
Speaking Center
Student Accessibility Services
Student Athlete Success Center (SASC)
Testing and Certification
Test Preparation
University Academic Advising Services
University Center for Excellence in Writing (UCEW)
Writing Across the Curriculum (WAC)