FALL 2022

SYLLABUS

Course title	**Intermediate ODEs**
Course number	MAP 4305/5304
Schedule	**Online**
Instructor	Maia Martcheva
	maia@ufl.edu
	http://people.clas.ufl.edu/maia/
Office hours	M 6th period (Lit 469); W 3rd period (Zoom)
	by appointment
Office	Little Hall 469

Goal: Students will have more advanced skills with ordinary differential equations (ODEs). Students will be introduced to and develop skills to work with systems of ODEs.

Textbook: Fundamentals of Differential Equations and Boundary Value Problems, Nagle, Saff, Snider (authors), Pearson, 2018, 7th edition.

Software: MyLab by Pearson

Modules:

(1) Review of basic relevant concepts of MAP 2302.
(2) Section 5.2: Differential Operators and the Elimination Method for Systems.
(3) Section 5.4: Introduction to the Phase Plane. Section 5.5: Applications to Bi-mathematics
(4) Section 9.4: Linear Systems in Normal Form
(5) Section 9.5: Homogeneous Linear Systems with Constant Coefficients. Section 9.6: Complex eigenvalues
(6) Section 9.7: Non-homogeneous Linear Systems
(7) Section 9.8: The Matrix Exponential Function
(8) Section 12.2: Linear Systems in the Plane.
(9) Section 12.3: Almost Linear Systems
(10) Section 12.4: Energy Methods, Section 12.5: Lyapunov's Direct Method
(11) Section 12.5: Limit Cycles and Periodic Solutions
(12) Section 12.7: Stability of Higher Dimensional Systems
(13) Section 11.2: Eigenvalues and Eigenfunctions
(14) Section 11.3: Regular Sturm-Liouville Boundary value Problems
(15) Section 11.4: Non-homogeneous Boundary Value Problems and the Fredholm Alternative

Prerequisites: MAP 2302 and MAS 3114 (or MAS 4105). Access and some familiarity with Mathematica will be useful. Students can obtain access to Wolfram Mathematica from UF Apps.

Requirements:

(1) There will be 3 exams taken in MyLab

- Exam 1 – **September 28 , 2022, online**.
- Exam 2 – **November 2, 2022, online**.
- Exam 3 – **December 7, 2022, online**.

(2) There will be the following quizzes in MyLab:
- Quiz 1 – **September 14, 2022, online**.
- Quiz 2 – **October 19, 2022, online**.
- Quiz 3 – **November 16, 2022, online**.

(3) You can take the exams and quizzes on the specified day from 9:00am to 8:00pm. Exams are 50 mins long, and quizzes are 30 mins long.

(4) You may use a simple calculator (the standard computer calculator). You may have scratch paper that needs to be destroyed when you finish the exam. Formula sheets (table of integrals and custom formula sheet) that may be used during an exam are provided in Canvas.

(5) There will be weekly homework assignments. Students are encouraged to work together on homeworks but each student should submit a personal homework on MyLab.

(6) Students will be expected to watch the videos.

(7) I will use Mathematica for computation and illustration. Having access to the software may be useful.

(8) Students will be expected to seek help from the instructor during office hours or by appointment.

Student Learning Outcomes:

(1) Students will be able to solve homogeneous and non-homogeneous first order linear systems with constant coefficients using matrix analysis or the elimination method for differential operators.

(2) Students will be able to analyze first order non-linear systems using phase-plane analysis, energy methods, including Lyapunov methods, and periodic solution Theorems.

(3) Students will be able to reduce a higher order equation or system to a first order system in normal form and then analyze it using methods for first order systems.

(4) Students will be able to solve homogeneous and non-homogeneous boundary value problems for second order ODEs.

Grading: Grades will be based on (1) Exams; (2) Quizzes; (3) Homework. The maximal possible grades are:
- Exam 1 – 100 points
- Exam 2 – 100 points
- Exam 3 – 100 points
- Quizzes – 150 points
- Homework – 25 points

- Lowest test score, lowest quiz score, and lowest 2 homework scores will be dropped.
- Maximal Total: 325 points

Additional grading policies:

(1) Class letter grades are based on a curve. Approximate minimal cutoffs are:
- A range – 292 points or higher
- B range – 260 points or higher
- C range – 227 points or higher
- D range – 195 points or higher

(2) **MyLab's grading is final.** It is your responsibility to input your results correctly.

(3) Pluses and minuses with the letter grades are assigned as appropriate and based on the curve. For example, if you are in the B range, you may get B-,B or B+.

(4) In case of planned absence of a test or a quiz, you may take the test or the quiz beforehand. In case of an emergency, if a quiz is missed, the drop should be used first. In case of an emergency, if an exam is missed, a make up may be approved and administered within one week of the regular exam. For a make up you should have had a true emergency, verified by emergency room attendance at time of the exam. If you had not had a true emergency, a drop should be used.

Special Accommodations:

Students requesting classroom accommodations or special arrangements during examinations must first register with the Disability Resource Center

https://disability.ufl.edu/

The DRC will provide documentation. The student must then present this documentation to instructor to meet the requesting accommodation. This should be done as early in the semester as possible.

Academic Honesty:

Students are expected to know and follow the Code of Student Conduct. In particular, students must refrain from cheating, not make their work available for cheating, give due credit and citation for any quoted work, and make only fair use of copyrighted materials and software. You are expected to take exams and quizzes on your own and complete the project within your team. The university has a policy on academic honesty, which should be followed.

U Matter We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu (or see http://www.umatter.ufl.edu/) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Course Evaluation:

Students are invited to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/