# SPRING 2020

## SYLLABUS

**Course title**  
Intermediate ODEs

**Course number**  
MAP 4305/5304

**Schedule**  
Online

**Instructor**  
Maia Martcheva  
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http://people.clas.ufl.edu/maia/

**Office hours**  
MWF 3rd period or 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 and boundary value problems for second order linear ODEs.


**Software:** MyLab by Pearson

**Calculator:** You may use during testing the simple calculator that comes with your computer and performs algebraic manipulations and possibly can compute trigonometric functions but has no graphing capabilities, and it cannot work with matrices and differential equations.

**Modules:**

1. Review of basic relevant concepts of MAP 2302.
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
9. Section 12.3: Almost Linear Systems
10. Section 12.4: Energy Methods, Section 12.5: Lyapunov’s Direct Method
11. Section 12.6: 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 tests
   • Exam 1 – February 12, 2020, 5th period, online.
   • Exam 2 – March 25, 2020, 5th period, online.
   • Exam 3 – April 22, 2020, 5th period, online.

(2) There will be the following quizzes:
   • Quiz 1 – January 29, 2020, 30 min at the beginning of 5th period, online.
   • Quiz 2 – March 11, 2020, 30 min at the beginning of 5th period, online.
   • Quiz 3 – April 8, 2020, 30 mins at the beginning of 5th period, online.

(3) Honorlock will proctor your exams in this class this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.

   To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install

   When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking “Launch Proctoring” will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it’s on a secondary device.

   Good luck! Honorlock support is available 24/7/365. If you encounter any issues, you may contact them by live chat, phone (855-828-4004), and/or email (support@honorlock.com).

(4) There will be weekly homework assignments. Students are encouraged to work together on homeworks.

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

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

(7) Students will be expected to initiate and participate in online discussions of the material, homework and quizzes.

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) Tests; (2) Quizzes; (3) Homework.

- Exam 1 – 100 points
- Exam 2 – 100 points
- Exam 3 – 100 points
- Quizzes – 100 points
- Homework – 25 points

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

Additional grading policies:

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

(2) 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 or a test is missed, the drop should be used first. A make up exam in extreme situation 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.

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://gatorevals.aa.ufl.edu/students/. 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://gatorevals.aa.ufl.edu/public-results/