

Instructor

Prof. Boaz Ilan

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Discussion Section Leaders

Ms. Terese Thompson, tthompson5@ucmerced.edu

Mr. Haik Stepanian, hstepanian@ucmerced.edu

Lectures Time & Location

01: TR 1:30pm–2:45pm, SSB 130, Ilan

Discussion Sections Time & Location

02: Monday 7:30am–9:20am, COB 279, Thompson

03: Wednesday 7:30pm–9:20pm, COB 279, Stepanian

04: Thursday 3:30pm–5:20pm, COB 286, Stepanian

Office Hours

Ilan: Tuesday 3pm–4pm or by appointment, S&E #1 334

Thompson: Wednesday 10am–12pm, AOA 182

Stepanian: Monday and Wednesday, 12:30pm–2:30pm, COB 205

Course Topics

- Solving linear and nonlinear first-order ordinary differential equations.
- Elements of Linear Algebra, including solving systems of algebraic equations, elements of the theory of vector spaces, eigenvalues & eigenvectors of matrices.
- Solving linear homogeneous and inhomogeneous system of differential equations.
- Apply these techniques to model and analyze dynamical systems.

Course Goals and Objectives

My goals are that by the end of this course you will have learned several analytical techniques for solving differential equations, some of the fundamental concepts in the theories of differential equations and linear algebra, and how to apply these techniques and theories to solving dynamical systems.

Graduate of MATH 24 should be able to fulfill the following **Learning Outcomes**

- Solve first-order differential equations using the methods of Integrating Factor, Separation of Variables, and qualitative (geometrical) methods.
- Determine the existence, uniqueness and stability of solutions of differential equations.
- Solve linear algebraic systems using Gauss Elimination.
- Calculate the inverses, determinants, eigenvalues and eigenvectors of matrices, and understand their significance for solving linear algebraic and differential equations.
- Determine the span and linear dependence of vectors, and whether they form a basis for a vector space.
- Solve linear homogeneous differential equations using eigenvalues and eigenvectors.
- Solve linear inhomogeneous differential equations using the methods of Undetermined Coefficients and Variation of Parameters.
- Model and analyze the behavior of prototypical dynamical models, such as growth / decay, predator-prey, and oscillators.

Textbook: *Differential Equations and Linear Algebra*, 2nd edition, by Farlow, Hall, McDill and West. We will cover most of Chapters 1-7.

Course website

The MATH 24 website is part of the CatCourses course management system¹. It is available automatically to all students enrolled in this class. The website contains the course calendar, announcements, and email list. We will use this site to distribute course materials and make email announcements.

Discussion sessions

Discussion sessions will meet for two hours each week, where you will develop and practice your problem-solving skills by working with your classmates to solve challenging problems. Your discussion section grade will be based on your attendance, participation, and quiz scores. *Your participation in your assigned discussion sections is necessary and will be graded (see below)*. If you would like to change the discussion section to which you are assigned, you must do so in advance by approaching the Instructor and Teaching Assistants.

Discussion sections will be centered around worksheets with problems considerably more challenging than the homework problems. Worksheets will be posted on Catcourses. It is your responsibility to print a copy of the worksheet before attending to your discussion section.

Grade determination

Your final grade in the course will be based on the following scheme (details below).

- Three exams: 80%.
- Quizzes: 16%.
- Discussion section participation: 4%.

If you obtain 90% of the total points you will definitely receive an A in the course. If you obtain less than 55% of the total points you will definitely receive an F. For everything in between, letter grades will be given using the **approximate** scheme: A: 90-100%, B: 80-90%, C: 70-80%, D: 60-70%. Please be aware that you need a C- or better in order to proceed to Advanced Mathematical Methods as well as advanced Engineering courses.

Exams

There will be two unit (term) exams and a final exam. Each of the exams will cover the material between the exams. The lecture preceding every unit exam will serve as a review session. The exams will take place during the time allotted for the lecture as follows:

Exam 1: Tuesday, March 1, Lecture Time and Location.

Exam 2: Tuesday, March 29, Lecture Time and Location.

Final Exam: Thursday, May 12, 6:30pm-7:45pm, SSB 130.

There will be no make-up exams or early exams! To accommodate for unexpected emergencies or illness, your lowest exam score will be dropped when determining your final grade. Notwithstanding, if you are sick during a unit exam, or cannot attend a unit exam / lecture / discussion for any other reason, please inform your Instructor and TA as soon as possible.

Crib sheet and calculators are not allowed on exams. Please bring your student ID to each exam. A special needs room for people with documented disabilities will be provided for each exam.

Quizzes

Eight short quizzes will be given during the discussion sessions. Quiz dates will not be announced. **The quizzes will be graded only for those students participating in their assigned discussion section.** Notebooks, books, calculators and crib sheets will not be allowed on quizzes. The quiz will typically include one problem taken from one of homework problems due during the previous week. To accommodate for unexpected emergencies or illness, your two lowest discussion (quiz / participation) scores will be dropped when determining your final grade.

¹<http://catcourses.ucmerced.edu>

Homework

Homework problems will be assigned per lecture (see Schedule). However, **homework will not be collected**. It is your responsibility to know how to solve your homework assignments. You are encouraged to work in groups. In case you have questions or problems with the homework assignments, it is your responsibility to discuss them with the Instructor and Teaching Assistants.

Green / blue books

Each student is required to purchase **three** green or blue books. To receive full credit for participation, you must give your books to your Teaching Assistant no later than **Monday, February 8**. Green books are preferred to blue books, because they are made from a recycled material. The books will be distributed during the exams, so please do not write anything (not even your name) on the books. Note that you may receive books of a different color than the ones you have purchased.

Dropping the course

You may drop this course before **5:00pm Monday, February 8**. Withdrawing from the course after this time will require a petition approved and signed by the Instructor and your cognizant Dean, and a fee will be assessed. Please see the Instructor and consult the UC Merced *General Catalog* for more details.

Electronic Devices

All portable electronic devices (*e.g.* cell phones, pagers and laptops) must be turned off and put away during exams, lectures, and discussion sections. Calculators may be used in lectures and discussion sections, but not in exams. If permitted by your Instructor, a laptop may be used during the lecture or discussion sessions for the sole purpose of taking notes and as a calculator.

We recommend that you use a calculator (graphing or otherwise) and/or other computational tools (*e.g.* *Mathematica*, *Maple*, *Matlab*, *Octave*, *etc.*) to aid in your completion of homework assignments. You may need some calculation tools for certain homework and discussion section problems, but not on exams.

Extra help

You are encouraged to get extra help whenever you need it. Instructor and Teaching Assistant office hours are listed above. Other helpful items are posted on CatCourses. You are welcome to send questions to the Instructor and Teaching Assistants via Email. **Free Tutoring** is available through the Calvin E. Bright Success Center². The Center also provides Student Success Workshops.

For your convenience, MATH 24 exams from years 2006–2009 are available on the Applied Math website³.

Special accommodations

If you qualify for accommodations because of a disability, please submit a letter from Disability Services to the Instructor in a timely manner so that your needs may be addressed. Student Affairs determines accommodations based on documented disabilities.

The Instructor will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please speak with me during the first week of classes regarding any potential academic adjustments or accommodations that may arise due to religious beliefs during this term.

Academic Integrity

Academic Integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic Integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty. The current policies for UC Merced are described in the Academic Honesty Policy⁴. Examples of academic dishonesty include:

- receiving or providing unauthorized assistance on examinations

²<http://learning.ucmerced.edu/>

³<http://appliedmath.ucmerced.edu/academics/undergraduate-education/past-exams>

⁴See under Student Judicial Affairs at <http://studentlife.ucmerced.edu>

- using unauthorized materials during an examination
- plagiarism - using materials from sources without citations
- altering an exam and submitting it for re-grading
- fabricating data or references
- using false excuses to obtain extensions of time or to skip coursework.

The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic Integrity. These responsibilities include:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct which you witness.
- Do not submit the same work in more than one class. Unless otherwise specified by the instructor, all work submitted to fulfill course requirements must be work done by the student specifically for that course. This means that work submitted for one course cannot be used to satisfy requirements of another course unless the student obtains permission from the instructor.
- Unless permitted by the instructor, do not work with others on graded coursework, including in class and take-home tests, papers, or homework assignments. When an instructor specifically informs students that they may collaborate on work required for a course, the extent of the collaboration must not exceed the limits set by the instructor.
- Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source. Students who are confused about whether a particular act constitutes plagiarism should consult the instructor who gave the assignment.
- Know the rules—ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Homework and exam preparation requirements & guidelines⁵

Learning mathematics involves learning how to communicate your ideas effectively. As a student, much of this communication will be in a written form, either by homework, quizzes, or exams. So that we may provide you with meaningful and worthwhile feedback, it is important that you write your work in an easy to read, easy to navigate format. After all, how you present your work should enhance the ideas you are trying to communicate, not impede them.

It is good practice to first work out the solutions to the problems on scratch paper, and to then neatly write up your solutions.

The following are the **requirements** for submitting quizzes and exams in MATH 24:

- Your handwriting should be legible.
- In the upper right-hand corner you must write (in this order):
 - First and Last Name

⁵ <http://www.math.hmc.edu/homework/>

- “MATH 24”, followed by your Discussion Section Number or Teaching Assistant’s name.
- Problems should be clearly labeled and numbered on the left-hand side of the page. There should also be a visible separation between problems.
- All graphs should have clearly labeled axes.