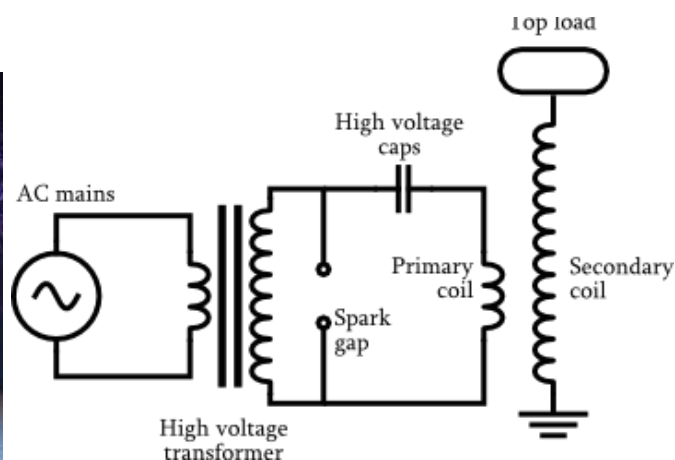
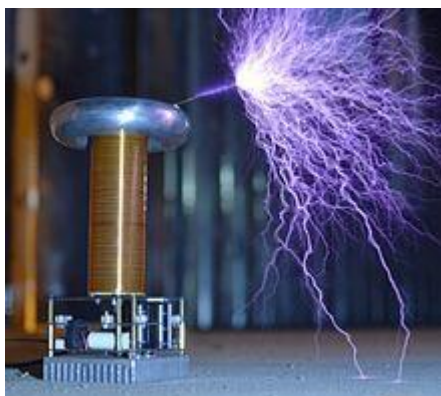


DIFFERENTIAL EQUATIONS



Tesla Coil. The Tesla coil is an electrical resonant transformer circuit designed by inventor Nikola Tesla in 1891. It is used to produce high-voltage, low-current, high frequency alternating-current electricity. The circuit is deceptively simple and its analysis requires differential equations. https://en.wikipedia.org/wiki/Tesla_coil

Math 3F 21059 Summer 2021 June 21 – July 23 College of Alameda

Course Catalog Description

3 units, 3 hours lecture (GR)

Instructor: TBD

Prerequisite: Math 3B and 3E, Recommended Preparation: Math 3C

Math 3E plus 3F are equivalent to Math 3D. Not open for credit to students who have completed or are currently enrolled in Math 3D.

Acceptable for credit: CSU, UC

Ordinary differential equations: First-order, second-order, and higher-order equations; separable and exact equations, series solutions, Laplace transformations, systems of differential equations. 17011.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 240

In this syllabus

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Important Dates	4
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Materials

For this course you will need: **consistently reliable internet access and consistently reliable computer access.** The textbooks are available on Canvas (Trench and Stewart).

You will also need a journal/notebook that you can write in and leave with me for grading. More details available on Canvas.

How to succeed in this course

For a “Satisfactory” Grade

- Complete all of the practice exercises.
- Attempt at least 85% of the homework and attend at least 85% of the classes.
- Each week, work on differential equations at least 9 hours outside of class (practice problems, homework, rewriting notes, textbook, etc).

For a “Good” or “Excellent” Grade

- Master all of the practice exercises.
- Complete all of the homework; after the first few problems, try to do the homework without referencing your notes or the book.
- Actively participate in all of the lectures; ask questions, listen to others’ questions, take notes on what is written *and* said.
- As soon you can after class, go back over your notes. Look for any errors and/or omissions. Fill in any information you didn’t have time to write down in class.
- Practice, practice, practice!

Course Requirements

Attendance: As stated in the Academic Regulations, Policies & Standards for the College of Alameda (COA), students “are expected to be in class, prepared for instruction, at the designated class starting time.” You are expected to post notes four times throughout the semester. See Canvas for the note-posting schedule and the grading rubric for note-posting.

Homework: To learn mathematics, there is no substitute for solving problems. Therefore, problem sets will be due most weeks (see Canvas for the schedule). Problems sets are submitted electronically (via Canvas). No late

assignments are accepted. Your two lowest homework grades will be dropped.

Exams: We will have four exams. Exams cannot be rescheduled.

Journal: Keep a math journal by writing your questions, thoughts and comments on what you observe, notes, and homework solutions in one notebook. Occasionally, you will be given journal prompts. Your journal might be checked before each exam. More information will be posted in Canvas about the requirements for the journal.

Assessment Activities	Homework	10%
	Journal	10%
	Exams	20% each

Evaluation Scale	Let x represent your overall percentage.
	A: $88\% < x$
	B: $78\% < x < 87.9\%$
	C: $68\% < x < 77.9\%$
	D: $50\% < x < 67.9\%$
	F: $x < 49.9\%$



Guido Menzio, an economics professor at U Penn, was interrogated for doing math on an American Airlines flight in 2016. He was solving a differential equation - passengers didn't recognize the foreign, cryptic symbols and reported him to authorities.

https://www.washingtonpost.com/news/rampage/wp/2016/05/07/ivy-league-economist-interrogated-for-doing-math-on-american-airlines-flight/?utm_term=.4a7ba88eed3d

Student Learning Outcomes

Develop problem solving abilities: Synthesize data, translate words into math language, and construct an abstract model that describes the problem.

Given data, students will analyze information and create a graph that is correctly titled and labeled, appropriately designed, and accurately emphasizes the most important data content.

Students will be able to write and manipulate complex algebraic expressions and general functions and integrate algebraic and transcendental functions of several variables.

Academic Accommodations

"If you have a disability which may require classroom or test accommodations, please contact Programs and Services for Students with Disabilities (DSPS) in Room D117 or call DSPS at 510-748-2328. You will need to provide written documentation of your disability. If you think you have a disability but currently have no documentation, DSPS may be able to help you. If you already have an accommodation notification from DSPS, please submit it to the instructor immediately. All information will be kept confidential."

Academic Dishonesty

The College follows the legal opinion set forth by the California Community Colleges' legal department which limits the consequences of an act of academic dishonesty to a failing grade on the activity, assignment, or test involved. For more information on student standards of conduct, discipline procedures, and due process, please see District Policies and Procedures.

Help and Resources

COA provides a comprehensive program of services to assist students to obtain the maximum benefit from their education. Information about services for students can be found in College of Alameda Course Catalog. The Student Center (Building "F") houses the Student Leadership Office, Cafeteria, the Student Lounge, the Cyber Cafe, offices of the ASCOA, mailboxes for recognized clubs and organizations, Student Health Services, and the College Store.

If you need to get online but don't have internet access, I encourage you to use the computers in the Math Lab or the Open Lab (top floor of the L-Building). To do this, sign up for LRNRE 501 – Supervised Tutoring. This course is a no-credit ungraded course that will not show up on an official transcript. Your effort to sign up this course will help keep our labs open and free to all students.

Other services include:

- Extended Opportunity Programs and Services (EOP&S)
- Drop-in academic help in the Learning Resource Center (LRC)
- Veterans and Veterans' Dependents Services

Tentative Schedule

Week	Lecture Topic	Reading
1	Introductions; Solving DE	1.1 (Trench)
	First-Order DE	1.2 (Trench)
	Direction Fields	1.3 (Trench)
	Variation of Parameters: Linear First-Order DE	2.1 (Trench)
	Separable Equations	2.2 (Trench)
	Existence and Uniqueness of Solutions of Nonlinear Equations	2.3 (Trench)
2	Transformations: Nonlinear First-Order DE to Separable DE [Bernoulli Equations]	2.4 (Trench)
	Review	
	Exam 1	
	More on Modeling with DE	9.1 (Stewart)
	More on Direction Fields and Euler's Method	9.2 (Stewart)
	More on Separable Equations	9.3 (Stewart)
	Models for Population Growth	9.4 (Stewart)
3	Summary on Linear Equations	9.5 (Stewart)
	Exact Equations	2.5 (Trench)
	Professional Day (no classes)	

Week	Lecture Topic	Reading
3	Review	
	Exam 2	
	Spring Break (no classes)	
	Predator-Prey Systems	9.6 (Stewart)
4	Second-Order Linear Equations	17.1 (Stewart)
	Nonhomogeneous Linear Equations	17.2 (Stewart)
	Applications of Second-Order Differential Equations	17.3 (Stewart)
	Series Solutions	17.4 (Stewart)
	Exam 3	
5	Definition of Laplace Transform	8.1 (Trench)
	Inverse Laplace Transforms	8.2 (Trench)
	Laplace Transforms: Solutions of IVP	8.3 (Trench)
	Laplace Transforms: Unit Step Function	8.4 (Trench)
	Exam 4 (12-2P)	