Math 2410Q - UCONN at Stamford - Summer Session Syllabus – July 11, 2023, to August 10, 2023, Tuesdays and Thursdays 6:00 pm to 9:30 pm.

Instructor: Cristiano Husu E-mail: cristianohusu@sbcglobal.net, 203 329 0489 (call between 9 am to 9 pm), cristiano.husu@uconn.edu, 203 251 9537.

Textbook: Extensive lecture notes carefully written by the instructor, C. Husu, will be available prior to each class both on huskyct.uconn.edu and by email to the email addresses that you provided to the instructor. Examples, exercises and reviews will also be available. *Students will be encouraged to ask questions during the WeBex classes and after the classes about any topic that may need further clarifications by the end of the lecture*.

For a slightly different point of view, students may wish to consult the textbook "A First Course in Differential Equations, with Modeling Applications" 11th ed., by Dennis G. Zill, Chapters 1, 2, 3, 4, 5, 6, 7 and 8.

Course Description: Introduction to ordinary differential equations and their applications, linear differential equations, systems of first order linear equations, numerical and qualitative methods.

Prerequisites: Math 1132Q (Calculus II). Note that, although recommended, Math 2110Q, Calculus III, and Math 2210Q, Linear Algebra, are not required.

PDF text of each lecture will be posted on huskyct.uconn.edu before the start time of each class.

Ask questions by email cristianohusu@sbcglobal.net

Call 203 329 0489 and leave a message if I do not pick up the phone.

All classes will be livestreamed and recorded via WeBex classes. Connect to WeBex Tuesdays and Thursdays at 6:00 pm via the WeBex room

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the Webex connection will be unlocked (no need of a code to get in). Let me know any other way you are comfortable with communicating mathematics (Phone pictures of our work. Regular mail exchanges of papers. Skype, Zoom, other social media). I am open to suggestions.

OFFICE HOURS by appointment at the end of each class, emailing cristianohusu@sbcglobal.net and/or calling 203 329 0489.

Classwork and Homework: Homework is assigned at the end of most classes. Samples of the homework are discussed at the beginning of the most classes.

Grading Procedure: Classwork (class participation) and Homework, 20% of the course grade.

First Examination on Lecture Notes 1. 2, 4, 6 and 7, July 20, 20% of the course grade.

Second Examination on Lecture Notes 11. 12, 19, 20 and 21, August 3, 20% of the course grade.

Comprehensive Final Examination, August 10, 2023, the remaining 40%. Additional percentage points available as "Extra Credit".

Week by week description of the course:

Note that I wrote, in red, below, the material that we will study more carefully and that will be used in the above examinations.

On the other hand, I wrote, in blue, below, the material that will be posted on huskyct.uconn.edu and that, although important for your future study of mathematics, will not be used in the exams.

Week	Date	Book Section	Lecture Notes Numbers and Topics
1	7/11	1.1	Lecture Notes 1: Definitions and Terminology
	7/11	1.2	Lecture Notes 2: Initial Valued Problems *with a theorem of existence and uniqueness of solutions of initial value problems* and Differential Equations associated to Initial Valued Problems
	7/11	1.3	Lecture Notes 3: Differential Equations as Mathematical Models
	7/13	2.1	Lecture Notes 4 Solution Curves - Direction Fields of First-Order Differential Equations – Phase Lines of Autonomous First-Order Differential Equations

	7/13	2.2	Lecture Notes 5: Separable First-Order Differential Equations
	7/13	2.3	Lecture Notes 6: Linear First-Order Differential Equations
2	7/18	2.4	Lecture Notes 7: Exact First-Order Differential Equations
	7/18	2.5, 2.6	Lecture Notes 8: Solutions by Substitutions. Euler's Numerical Method for First-Order Differential Equations
	7/18	3.1 and 5.1	Lecture Notes 9: Linear Models. Nonlinear Models. Spring/Mass Systems. Free Dumped Motion. Circuits. *Review for the First Exam on Chapters 1, 2 and Section 3.1*
	7/18	3.2, 3.3	Lecture Notes 10: Modeling with Systems of First-Order Differential Equations
	7/20		*First Exam on Chapters 1, 2 and Section 3.1*
	7/20	4.1.1 and 4.1.2	Lecture Notes 11: Linear Differential Equations and Linear Homogeneous Differential Equations - Linear Differential Equations and Linear Homogeneous Differential Equations with constant coefficients
3	7/25	4.1.3	Lecture Notes 12: Nonhomogeneous Linear Differential Equations - Introduction to the method of undetermined coefficients – Introduction to the Superimposition approach
	7/25	4.2	Lecture Notes 13: Reduction of Order for Second-Order Linear Differential Equations for which a solution is known. Additional Analytic Methods for Special Systems
	7/25	4.3	Lecture Notes 14: Further work on Homogeneous Linear Equations with constant coefficients
	7/27	4.4	Lecture Notes 15: Further work on Nonhomogeneous Linear Equations with constant coefficients and on the Method of Undetermined Coefficients – the Superimposition approach
	7/27	B1 and	Lecture Notes 16: Matrices. Basic Definitions.

		B2	Gauss-Jordan Elimination.
	7/27	B3	Lecture Notes 16+1: Eigenvalues and Eigenvectors of Square Matrices. The Eigenvalue Problem.
4	8/1	4.5 and 4.6	Lecture Notes 18: The Annihilation approach to the method of Undetermined Coefficients - The Variation of Parameters
	8/1	8.2.1	Lecture Notes 19: Homogeneous Linear Systems of Differential Equations: Distinct Real Eigenvalues
	8/1	8.2.2	Lecture Notes 20: Homogeneous Linear Systems of Differential Equations: Repeated Real Eigenvalues. *Review for the Second Exam on Chapter 4 and Sections 3.2, 3.3, 5.1*
	8/3		*Second Exam on Chapter 4 and Sections 3.2, 3.3, 5.1*
	8/3	8.2.3	Lecture Notes 21: Homogeneous Linear Systems of Differential Equations: Complex Conjugated Eigenvalues.
5	8/8	7.1	Lecture Notes 22: Power series solutions of linear differential equations
	8/8	7.2	Lecture Notes 23: The Laplace Transform
	8/8	7.3	Lecture Notes 24: The Inverse Laplace Transform
	8/10	7.4	Lecture Notes 25: Operational Properties of the Laplace Transform, Part I. *Comprehensive Review.*
	8/10	7.4	Lecture Notes 26: Operational Properties of the Laplace Transform, Part II
	8/10	7.5	*Extra Credit. Lecture Notes 27: The Laplace transform of the Dirac delta functions and its applications.*
	8/10	7.5	Comprehensive Final Exam