# University of North Texas at Dallas
# Spring 2013
# SYLLABUS

| MATH 3410D-090: Differential Equations I (3Hrs) | |
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| Department of | Mathematics and Information Sciences | Division of | Mathematics |
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| Instructor Name: | Mehmet Celik |
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| Office Location: | DAL2, Room #225 |
| Office Phone: | 972-338 1568 |
| Email Address: | Mehmet.Celik@unt.edu |

| Office Hours: | *Mon. 12:00pm-1:00pm & 4:00pm-5:00pm;*<br>*Tues. 9:30am- 10:30am & 04:00pm-05:00pm;*<br>*Wed. 12:00pm-1:00pm & 04:00pm-05:00pm;*<br>*Thur. 09:30am-10:30am & 01:00pm-03:00pm;* |
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| UNTD Mathematics Lab Hours: | *Here are the time intervals when I will be available for help in the Mathematics Lab.*<br>*Mon. 01:00pm-02:00pm;*<br>*Tues. 01:00pm-02:00pm.*<br>*Wed. 01:00pm-02:00pm.*<br><br>*Mathematics Lab Location: (Bldg#1, 3rd floor)*<br><br>*The Mathematics Lab hours are TBA.* |
| Virtual Office Hours: | *N/A* |

| Classroom Location: | *DAL2 Room #242* |
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| Class Meeting Days & Times: | *Monday & Wednesday 10:00AM-11:20AM* |

| Course Catalog Description: | First-order equations, existence-uniqueness theorem, linear equations, separation of variables, higher-order linear equations, systems of linear equations, series solutions and numerical solutions.<br>[Only one of MATH 3310 and MATH 3410 may be used to satisfy requirements for Mathematics major or minor.] |
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| Prerequisites: | *MATH 1720. Calculus II  &  MATH 2700.  Linear Algebra and Vector Geometry* |
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| Co-requisites: | N/A |

| Required Text: | • the title and edition of the book: *A First Course in Differential Equations with Modeling Applications,10th edition*<br>• the author(s): *Dennis G. Zill*<br><br>• **Enhanced WebAssign with eBook LOE Instant Access Code for One-Term Math and Science** ISBN-10: 1285181816 \| ISBN-13: 9781285181813<br>Exclusively from Cengage Learning, Enhanced WebAssign combines the exceptional Mathematics and Science content that you know and love with the most powerful online |
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| | homework solution, WebAssign. Enhanced WebAssign engages students with immediate feedback, rich tutorial content and interactive, fully customizable eBooks (YouBook) helping students to develop a deeper conceptual understanding of their subject matter. **This instant access code includes access to both Enhanced WebAssign and the eBook for your text and is sold standalone.** To learn about value bundles that include the printed access code plus the textbook, please visit *www.cengagebrain.com* <br> Class Key: **unt 2749 1472** <br><br> TI-89 Titanium –Graphing Calculator is also required! |
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| **Access to Learning Resources:** | UNT Dallas Library: <br>    phone: (972) 780-3625; <br>    web: http://www.unt.edu/unt-dallas/library.htm <br> UNT Dallas Bookstore: <br>    phone:  (972) 780-3652; <br>    e-mail:  1012mgr@fheg.follett.com |
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**Course Goals:**    The goal of this course is to prepare students for solving differential equations.

| **Expected Learning Objectives/Outcomes (Course): At the end of this course, the student will be able to** ||
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| 1 | Solve first order linear and nonlinear differential equations |
| 2 | Perform basic mathematical modeling using differential equations |
| 3 | Solve differential equations by using the series solution method |
| 4 | Solve second and higher order differential equations with constant coefficients |
| 5 | Solve system of differential equations using the matrices |
| 6 | Solve differential equations using numerical techniques |
| **Learning Objectives/Outcomes (Program):** ||
| 1 | Students will be able to demonstrate knowledge of problem-formulation, problem solving, and modeling techniques central to applications of mathematics. |
| 2 | Students will be able to competently use appropriate technology for solving mathematical problems. |

**Course Outline**

First-order equations, existence-uniqueness theorem, linear equations, separation of variables, higher-order linear equations, systems of linear equations, series solutions and numerical solutions.

    **Major Course Topics:**

1. First Order Differential Equations
   - Separable Variables
   - Linear Eq.
   - Exact Eq.
   - Solutions by Substitutions

2. Higher Order Differential Equations
   - IVP
   - Homogenous Linear Eq. with Constant Coefficients
   - Undetermined Coefficients
   - Variation of Parameters
   - Cauchy-Euler Equation

3. Series Solutions of Linear Equations
   - Solutions About Ordinary Points
   - Solutions About Singular Points

4. System of Linear First Order Differential Equations
   - Homogenous Linear Systems
   - Non-homogenous Linear Systems

5. Numerical Solutions
   - Runge - Kutta Method

This schedule is subject to change by the instructor. Any changes to this schedule will be communicated by email and in-class announcements.

| | Monday | Wednesday | Topics |
|---|---|---|---|
| **Week #1**<br>Jan. 14 – Jan. 16 | | | Definitions and Terminologies, Initial Value Problems (IVP):<br>Sections 1.1, 1.2<br>Solution Curves Without a Solution [Direction Fields, Autonomous First-Order DEs], Separable Variables:<br>Sections 2.1, 2.2 |
| **Week 2**<br>Jan. 21 – Jan. 23 | Martin Luther King, Jr. Day<br>(*university closed*) | *In-class Quiz* | Solution Curves Without a Solution [Direction Fields, Autonomous First-Order DEs], Separable Variables, Linear Equations:<br>Sections 2.1, 2.2, 2.3 |
| **Week 3**<br>Jan. 28 – Jan. 30 | | *In-class Quiz* | Exact Equations, Solutions by Substitutions, A Numerical Method:<br>Sections 2.4, 2.5, 2.6 |
| **Week 4**<br>Feb. 4 – Feb. 6 | | *In-class Quiz* | A Numerical Method, Differential Equations as Mathematical Models, Linear Models:<br>Sections 2.6, 1.3, 3.1, |
| **Week 5**<br>Feb. 11 – Feb. 13 | | *In-class Quiz* | Preliminary Theory – Linear Equations, Reduction of Order:<br>Sections 4.1, 4.2 |
| **Week 6**<br>Feb. 18 – Feb. 20 | *Practice Review for Exam #1* | **Exam #1** | |
| **Week 7**<br>Feb. 25 – Feb. 27 | | *In-class Quiz* | Preliminary Theory – Linear Equations, Reduction of Order:<br>Sections 4.1, 4.2 |
| **Week 8**<br>March 4 – March 6 | | *In-class Quiz* | Homogeneous Linear Equations with Constant Coefficients, Undetermined Coefficients-Superposition Approach:<br>Sections: 4.3, 4.4 |
| March 11 – March 15 | **SPRING BREAK** | | |
| **Week 9**<br>March18 – March20 | | *In-class Quiz* | Variation of Parameters, Cauchy-Euler Equation:<br>Sections 4.6, 4.7 |
| **Week 10**<br>March25 – March27 | | *In-class Quiz* | Solving System of Linear DEs by Elimination:<br>Sections 4.8<br>Solution About Ordinary Points, Solution About Singular Points<br>Sections 6.1, 6.2 |
| **Week 11**<br>Apr. 1 – Apr. 3 | | *In-class Quiz* | Preliminary Theory – Linear Systems, Homogeneous Linear Systems: |

| | | | Sections 8.1, 8.2 |
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| **Week 12**<br>Apr. 8 – Apr. 10 | *Practice Review for Exam #2* | **Exam #2** | |
| **Week 13**<br>Apr. 15 – Apr. 17 | | *In-class Quiz* | Preliminary Theory – Linear Systems, Homogeneous Linear Systems, Non-Homogenous Systems:<br>Sections 8.1, 8.2 (8.2.1&8.2.2), 8.3(8.3.2) |
| **Week 14**<br>Apr. 22 – Apr. 24 | | *In-class Quiz* | Preliminary Theory – Linear Systems, Homogeneous Linear Systems, Non-Homogenous Systems:<br>Sections 8.1, 8.2 (8.2.1&8.2.2), 8.3(8.3.2)<br>Runge - Kutta Methods:<br> Sections 9.2 |
| **Week 15**<br>Apr. 29 – May 1 | | | |
| | FINAL EXAM DATE AND TIME: Wednesday, May 08, 2013 10:00 AM - 12:00 PM | | |

## Course Evaluation Methods

This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course.

**Exams** – *Two Mid-term Exams and **a comprehensive Final Exam.*** There will be two Mid-term exams. You will have a full class period (80 minutes) to complete each. The date for each exam is pointed in the schedule. See Make-up Policy section for more information on the Exams. The Final Exam date is

| **Final Exam Date and Time:** | Wednesday, May 08, 2013 10:00 AM - 12:00 PM |
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**In-class Quizzes – In-class Quizzes** will be hold at the last 15 minutes of a class. The dates for each quiz are pointed on the schedule above. There will be no make-ups for any missed in-class quizzes. Instead, at the end of the semester ten of the highest in-class quizzes will be considered.

**Homework Assignments:** Every week there will be one homework assignment. The number of questions in the assignments may change but **only two randomly chosen questions will be graded from each assignment.** Homework assignments will be posted online to WebAssign.
- Students are going to keep two spiral notebooks for all assignments, when one assignment is being graded the other will be written on the second notebook. <u>Write</u> your work <u>clearly</u> just as you would if the assignments were submitted on paper.

**Course Project:** Each student will complete a project during the semester. The project questions will be announced (you can see the project questions list from the BlackBoard) during the semester. You are strongly advised to work on your project seriously. Doing a mathematical project not only will it enable you to test your understanding of the material you saw in class - you will understand mathematics through trying, failing, and eventually succeeding in solving a math problem. When you work on your project, first try to do it by yourself. After that, you may discuss it with others. You will learn from talking about mathematics. However, **do not copy any solutions from any internet sources or from others.** You are supposed to understand the problem (either through own research or discussion) and then formulate the solution in your own words. Discussing a project with a classmate (or your instructor), understanding it, and then formulating it in your own words are allowed. Copying

a solution from others is NOT allowed. **The due date for all projects submission is Friday April 19th, 2013**. After that date each student will be invited to my office for a discussion on his/ her project. The project worth 40 points for the semester.

## *Grading Matrix:*

| Instrument | Value (points or percentages) | Total |
|---|---|---|
| **In-class Quizzes** | 8 in-class quizzes (best ones) | 50 |
| **Homework Assignments** | 10 homework assignments (best ones) at 5 points each | 50 |
| **Course Project** | One project for the semester at 40 points | 40 |
| **Mid-Term Exams** | 2 midterm exams at 80 points each | 160 |
| **Final Exam** | One comprehensive final exam at 100 points | 100 |
| **Total:** | | **400** |

### Grade Determination:
A = 400 – 360 pts; i.e. 90% or better
B = 320 – 359 pts; i.e. 80 – 89 %
C = 280 – 319 pts; i.e. 70 – 79 %
D = 240 – 279 pts; i.e. 60 – 69 %
F = 239 pts or below; i.e. less than 60%

**Email Policy**: Use your **Blackboard** email account to contact me. You should check your email account on the Blackboard every day. You are responsible for any information that I send out via email. Due to privacy rights, I will not discuss grades over the phone. I will only answer emails from your **Blackboard** account.

**Calculator Policy:** TI-89 Titanium –Graphing Calculator is also required!

## University Policies and Procedures

### Students with Disabilities (ADA Compliance):
*The University of North Texas Dallas faculty is committed to complying with the Americans with Disabilities Act (ADA). Students' with documented disabilities are responsible for informing faculty of their needs for reasonable accommodations and providing written authorized documentation. Grades assigned before an accommodation is provided will not be changed as accommodations are not retroactive. For more information, you may visit the Student Life Office, Suite 200, Building 2 or call Laura Smith at 972-780-3632.*

**Student Evaluation of Teaching Effectiveness Policy:**
*The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider the SETE to be an important part of your participation in this class.*

**Assignment Policy:**
*There will be no make-ups for any missed in-class quizzes. Instead, at the end of the semester two of the lowest in-class quizzes will be dropped.*

**Exam Policy:**
*Exams should be taken as scheduled. No makeup examinations will be allowed except for documented emergencies (See Student Handbook). Specifically, in the case of injury or illness, you need to provide a note from a health care professional affirming date and time of a medical office visit regarding the injury or illness and stating that you should not be in class that day. You must notify me no later than the end of the second working day after the missed exam.*

**Academic Integrity:**
*Academic integrity is a hallmark of higher education. You are expected to abide by the University's code of Academic Integrity policy. Any person suspected of academic dishonesty (i.e., cheating or plagiarism) will be handled in accordance with the University's policies and procedures. Refer to the Student Code of Academic Integrity at [http://www.unt.edu/unt-dallas/policies/Chapter%2007%20Student%20Affairs,%20Education,%20and%20Funding/7.002%20Code%20of%20Academic_Integrity.pdf](http://www.unt.edu/unt-dallas/policies/Chapter%2007%20Student%20Affairs,%20Education,%20and%20Funding/7.002%20Code%20of%20Academic_Integrity.pdf) for complete provisions of this code. In addition, all academic work submitted for this class, including exams, papers, and written assignments should include the following statement:* **On my honor, I have not given, nor received, nor witnessed any unauthorized assistance that violates the UNTD Academic Integrity Policy.**

**Bad Weather Policy:**
*On those days that present severe weather and driving conditions, a decision may be made to close the campus. In case of inclement weather, call UNT Dallas Campuses main voicemail number (972) 780-3600 or search postings on the campus website [www.unt.edu/dallas](www.unt.edu/dallas). Students are encouraged to update their Eagle Alert contact information, so they will receive this information automatically.*

**Attendance and Participation Policy:**
*The University attendance policy is in effect for this course. Class attendance and participation is expected because the class is designed as a shared learning experience and because essential information not in the textbook will be discussed in class. The dynamic and intensive nature of this course makes it impossible for students to make-up or to receive credit for missed classes. Attendance and participation in all class meetings is essential to the integration of course material and your ability to demonstrate proficiency. Students are responsible to notify the instructor if they are missing class and for what reason. Students are also responsible to make up any work covered in class. It is recommended that each student coordinate with a student colleague to obtain a copy of the class notes, if they are absent.*
- *Excessive absences*
    - *more than 3 lectured classes may result in receiving an WF for the course.*

*For security measures once a student signs an attendance sheet she/he cannot leave the class without professor's permission.*
- *If a student needs to leave the class earlier she/he should talk to the professor before the class; the student should leave the classroom quietly.*
- *If a student has to leave the class (for example in case of a family emergency or a similar situation) the student must invite the professor politely out of the classroom to explain the situation.*

**Diversity/Tolerance Policy:**

*Students are encouraged to contribute their perspectives and insights to class discussions. However, offensive & inappropriate language (swearing) and remarks offensive to others of particular nationalities, ethnic groups, sexual preferences, religious groups, genders, or other ascribed statuses will not be tolerated. Disruptions which violate the Code of Student Conduct will be referred to the Center for Student Rights and Responsibilities as the instructor deems appropriate.*

**Copyright Policy:**

*The handouts used in this course are copyrighted. By "handouts," I mean all materials generated for this course, which include but are not limited to syllabi, lecture notes, quizzes, exams, in-class materials, review sheets, projects, and problems sets. Because these materials are copyrighted, you do not have the right to copy and distribute the handouts, unless I expressly grant permission.*

**Other Policy:**

### Classroom Etiquette:

*Appropriate behavior is expected of all students taking this course.*

- *Arrive to class promptly and do not leave until the scheduled ending time of the class.*
- *If you must arrive late or leave early, please do so as discreetly as possible and take a seat near the door.*
- *Turn off all non-medical electronic devices such as pagers, cell phones, laptops, etc. Take off the headphones.*
- *Do not read newspaper or work on unrelated assignments during class.*
- *I prefer that you not eat during class.*

### Grade Assignment:

*The student course grade is assigned according to the evaluation criteria and grading assignment stated on this syllabus.*

- *The grade is completely objective and is determined solely by student performance on each of the evaluation criteria (in-term exams, in-class quizzes, on-line quizzes, and the final exam).*
- ***Do not expect extra credit work or bonus grade assignments.***

### Student Behavior:

*Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT.*

- *Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Student Life Center to consider whether the student's conduct violated the Code of Student Conduct.*
- *The university's expectations for student conduct apply to all instructional forums, including university and electronic classroom, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at http://dallas.unt.edu/sites/default/files/page_level2/pdf/policy/7.001%20Code%20of%20Student%20Rights%20Responsibilities%20and%20Conduct.pdf*