NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: An applied science study using differential equations as the vehicle for comprehension of the unknown. Introduction to first-order differential equations and their applications to motion, cooling and electromechanical systems followed by higher order differential equations and their solutions. Study of methods of undetermined coefficients, variation of parameters, and many series and numerical methods. Includes Laplace transforms, matrix methods, and eigenvalue problems. Effective From: Fall 2012.

Number of Credits: 3

Prerequisites: Math 112 with a grade of C or better or Math 133 with a grade of C or better or Math 238 with a grade C or better.

Course-Section and Instructors

<table>
<thead>
<tr>
<th>Course-Section</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 322-102</td>
<td>Professor A. Ionescu</td>
</tr>
</tbody>
</table>

Required Textbook:

<table>
<thead>
<tr>
<th>Title</th>
<th>Elementary Differential Equations w/ BVP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Edwards, Penney</td>
</tr>
<tr>
<td>Edition</td>
<td>6th</td>
</tr>
<tr>
<td>Publisher</td>
<td>Pearson</td>
</tr>
<tr>
<td>ISBN #</td>
<td>978-0136006138</td>
</tr>
</tbody>
</table>

University-wide Withdrawal Date: Please note that the last day to withdraw with a W is March 28, 2016. It will be strictly enforced.

COURSE GOALS

Course Objectives
• Derive solutions of separable and linear first-order differential equations.
• Interpret solutions of differential equation models in mechanics, circuits, &c.
• Derive solutions of linear second order equations or systems that have constant coefficients.
• Apply the Laplace transform to solve forced linear differential equations.
• Determine the behavior of solutions near critical points of planar systems.
• Express the solutions of analytic differential equations in power series.

Course Outcomes

• Prepare students for further study in technological disciplines and more advanced mathematics courses.
• Students have an understanding of the importance of differential equations in the sciences and engineering.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework and Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm Exam I</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exam II</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
</tr>
</tbody>
</table>

Your final letter grade will be based on the following tentative curve.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 - 100</td>
</tr>
<tr>
<td>B+</td>
<td>85 - 89</td>
</tr>
<tr>
<td>B</td>
<td>80 - 84</td>
</tr>
<tr>
<td>C+</td>
<td>70 - 79</td>
</tr>
<tr>
<td>C</td>
<td>60 - 69</td>
</tr>
<tr>
<td>D</td>
<td>50 - 59</td>
</tr>
<tr>
<td>F</td>
<td>0 - 49</td>
</tr>
</tbody>
</table>

Attendance Policy: Attendance at all classes will be recorded and is mandatory. Please make sure you read and fully understand the Math Department’s Attendance Policy. This policy will be strictly enforced.

Homework Policy: Homework assignments are listed below.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. Exams are held on the following weeks:

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam I</td>
<td>Week 6</td>
</tr>
<tr>
<td>Midterm Exam II</td>
<td>Week 10</td>
</tr>
<tr>
<td>Final Exam Period</td>
<td>May 6 - 12, 2016</td>
</tr>
</tbody>
</table>

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the Math Department’s Examination Policy. This policy will be strictly enforced.

Makeup Exam Policy: There will be NO MAKE-UP QUIZZES OR EXAMS during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam
will be missed.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in Cullimore, Room 214 (See: Spring 2016 Hours)

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department’s webpage for Instructor Office Hours and Emails.

All students must familiarize themselves with and adhere to the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. The Department of Mathematical Sciences takes these policies very seriously and enforces them strictly.

Accommodation of Disabilities: NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at:


Important Dates (See: Spring 2016 Academic Calendar, Registrar)

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 19, 2016</td>
<td>T</td>
<td>First Day of Classes</td>
</tr>
<tr>
<td>January 25, 2016</td>
<td>M</td>
<td>Last Day to Add/Drop Classes</td>
</tr>
<tr>
<td>March 13 - 20, 2016</td>
<td>Su - Su</td>
<td>Spring Recess - No Classes, University Open</td>
</tr>
<tr>
<td>March 25, 2016</td>
<td>F</td>
<td>Good Friday - No Classes, University Closed</td>
</tr>
<tr>
<td>May 3, 2016</td>
<td>T</td>
<td>Friday Classes Meet/ Last Day of Classes</td>
</tr>
<tr>
<td>May 4 &amp; 5, 2016</td>
<td>W &amp; R</td>
<td>Reading Days</td>
</tr>
<tr>
<td>May 6 - 12, 2016</td>
<td>F - R</td>
<td>Final Exam Period</td>
</tr>
</tbody>
</table>

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Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Section</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Review of Calculus</td>
<td>Problems provided in class</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>Differential Equations</td>
<td>1-21 odd</td>
</tr>
<tr>
<td>3</td>
<td>1.2</td>
<td>General &amp; Particular Solutions</td>
<td>1-4,7,9,11,13</td>
</tr>
<tr>
<td></td>
<td>1.4</td>
<td>Separable &amp; First Order Equations</td>
<td>1,3,5,9,19,21,23,25</td>
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<tr>
<td>5</td>
<td>1.6</td>
<td>Exact Equations</td>
<td>1-9 odd,31,33,35,37,43,45,47,49,51</td>
</tr>
<tr>
<td>4</td>
<td>1.5</td>
<td>Equations, Integrating factors</td>
<td>1-15 odd</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>REVIEW FOR EXAM &amp; TEST 1:</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Topics</td>
<td>Problems</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------------------------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Second order linear equations</td>
<td>1,3,5,9,21,23,25,33-41 odd</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>General Solutions, Wronskian</td>
<td>1-19 odd</td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Homogeneous Equations</td>
<td>1,3,5,9,11,21,23,27,29</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Nonhomogeneous Equations, Undetermined Coefficients</td>
<td>1,3,5,9,11,21,23,25,31,33,47,49,51,53</td>
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<tr>
<td>1.6</td>
<td>REVIEW FOR EXAM &amp; TEST 2:</td>
<td>SECTIONS: 2.1, 2.2, 2.3, 2.5</td>
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<tr>
<td>2.1</td>
<td>Second order linear equations</td>
<td>1,3,5,9,21,23,25,33-41 odd</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>General Solutions, Wronskian</td>
<td>1-19 odd</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>Homogeneous Equations</td>
<td>1,3,5,9,11,21,23,27,29</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Nonhomogeneous Equations, Undetermined Coefficients</td>
<td>1,3,5,9,11,21,23,25,31,33,47,49,51,53</td>
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<tr>
<td>3.1</td>
<td>Power Series</td>
<td>1,3,5,7,11,13,15,17,19,21</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Series Solutions Near Ordinary Points, Euler's Equation</td>
<td>1,3,5,7,9</td>
<td></td>
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<tr>
<td>4.1</td>
<td>Laplace transforms</td>
<td>1,3,5,11,13,15,17,19,23,27,29</td>
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<tr>
<td>4.2</td>
<td>Transformation of IVP</td>
<td>1-21 odd</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>Translation and Partial Fractions</td>
<td>1-21 odd, 27, 29, 31</td>
<td></td>
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<tr>
<td>5.1</td>
<td>First Order Systems</td>
<td>1,3,5,11,13,15</td>
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<tr>
<td>5.3</td>
<td>Matrices and Linear Systems</td>
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<td></td>
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<td>10</td>
<td>REVIEW FOR EXAM &amp; TEST 2:</td>
<td>SECTIONS: 2.1, 2.2, 2.3, 2.5</td>
<td></td>
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<tr>
<td>11</td>
<td>Power Series</td>
<td>1,3,5,7,11,13,15,17,19,21</td>
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<tr>
<td>12</td>
<td>Laplace transforms</td>
<td>1,3,5,11,13,15,17,19,23,27,29</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Transformation of IVP</td>
<td>1-21 odd</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Translation and Partial Fractions</td>
<td>1-21 odd, 27, 29, 31</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Matrices and Linear Systems</td>
<td>1,3,5,11,13</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>COMPREHENSIVE FINAL EXAM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Updated by Professor A. Ionescu - 1/15/2016*

*Department of Mathematical Sciences Course Syllabus, Spring 2016*