

# MAP2302 Elementary Differential Equations

Spring 2024

Course Coordinator: Carol Demas

## 1. General Information

| Instructor     | Carol Demas              | Dr. Yuli Rudyak | Dr. Scott Keeran |
|----------------|--------------------------|-----------------|------------------|
| Lecture Period | 4 MWF                    | 5 MWF           | 6 MWF            |
| Section        | 3141/13598               | 3142/13599      | 3146/13600       |
| Classroom      | LIT109                   | LIT109          | LIT109           |
| office         | LIT323                   | LIT406          | LIT390           |
| office hours   | TBA<br>or by appointment | TBA             | TBA              |
| email          | demasc@ufl.edu           | rudyak@ufl.edu  | keeran@ufl.edu   |

## Teaching Assistants

| TA           | Jack Graham         | Brendan Williams         | Alexander Wong | Afsana Yesmin        | Darren Schmidt   |
|--------------|---------------------|--------------------------|----------------|----------------------|------------------|
| office       | LIT 423             | LIT 403                  | LIT 475        | LIT 453              | LIT 443          |
| office hours | TBA                 | TBA                      | TBA            | TBA                  | TBA              |
| email        | jack.graham@ufl.edu | brendan.williams@ufl.edu | awong3@ufl.edu | afsanayesmin@ufl.edu | schmidtd@ufl.edu |

**Course Description** MAP2302 is a course covering first-order ordinary differential equations, theory of linear ordinary differential equations, solution of linear ordinary differential equations with constant coefficients, the Laplace transform and its application to solving linear ordinary differential equations. It also covers series solution, graphical, and numerical approximations to solutions of differential equations.

**Course Overview.** The laws of nature are expressed as differential equations. Scientists and engineers must know how to model the world in terms of differential equations, and how to solve those equations and interpret the solutions. This course focuses on linear differential equations and their applications in science and engineering. More details are given in the course goals below.

**Prerequisites.** MAC 2312 or MAC 2512 or MAC 3473 with a minimum grade of C.

**Course objectives and/or goals:** By the end of the course students will know how to

1. Classify differential equations.
2. Model physical phenomena with first and second order differential equations.
3. Visualize solutions to differential equations using direction fields and approximate them using Euler's method.
4. Solve first order separable, linear, and exact differential equations, make equations exact using integrating factors, and use transformations to solve first order differential equations.
5. Solve second order linear differential equations and variable coefficient equations with real or complex roots, solve non-homogeneous differential equations using the method of undetermined coefficients and variation of parameters..
6. Use Laplace transforms to solve differential equations.
7. Use power series and Taylor polynomials to approximate solutions to differential equations.
8. Solve higher order linear differential equations.

## General Education Credit: Mathematics

This course accomplishes the General Education objectives of the subject area listed above. A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

### Required Reading and Works.

We will use the textbook Fundamentals of Differential Equations and Boundary Value Problems by R. Kent Nagle, Edward B. Saff and Arthur David Snider, ISBN-13: 978-0321977106, ISBN-10: 9780321977106. You may use the previous edition and/or the version without boundary value problems if you prefer.

### General Education Objective and Learning Outcomes

This course will provide instruction in computational strategies in first- and higher order ordinary differential equations including linear ordinary differential equations, solution of ordinary differential equations with constant coefficients, the Laplace transform and its application to solving linear ordinary differential equations, infinite series, graphical, and numerical approximations to solutions of differential equations. This course includes reasoning in abstract mathematical systems, formulating mathematical models and arguments, using mathematical models to solve problems and applying mathematical concepts effectively to real-world situations.

**Materials and Supplies Fees:** n/a

## II. Graded Work

| Assignment      | Assignment Description  | General Education Mathematics SLOs Met    | % of Grade            |
|-----------------|---|---|-----------------------|
| Lecture Quizzes | After each lecture, you will take a short canvas quiz on the material covered on that day. The two lowest lecture quiz grades will be dropped at the end of the semester. | Communication, Content, Critical Thinking | 10%                   |
| Quizzes         | There are weekly Canvas quizzes covering 2-4 lectures based on homework. The two lowest quiz grades will be dropped at the end of the semester.                           | Communication, Content, Critical Thinking | 13%                   |
| Online Homework | One for each lecture, unlimited attempts before the due date. The lowest two scores are dropped.  | Communication, Content, Critical Thinking | 7%                    |
| Midterm exams   | Exam 1 covers First Order DEs, Exam 2 covers Second Order DEs, Exam 3 Covers Laplace Transforms   | Communication, Content, Critical Thinking | 3 exams at 17.5% each |
| Final Exam      | Comprehensive, 50% previous material and 50% series solutions   | Communication, Content, Critical Thinking | 17.5%                 |
| Extra Credit    | Optional assignments on Higher Order DEs  | Communication, Content, Critical Thinking | Up to 2% bonus        |

**Grading Scale:** UF Grading policies may be accessed here. The letter grade will be awarded with Canvas rounding up the display grade (i.e. 89.5 counts as A) as follows:

|    |               |    |         |
|----|---------------|----|---------|
| A  | 90% or higher | C  | 70%-74% |
| A- | 87%-89%       | C- | 67%-69% |
| B+ | 85%-86%       | D+ | 64%-66% |
| B  | 80%-84%       | D  | 60%-63% |
| B- | 77%-79%       | D- | 57%-59% |
| C+ | 75%-76%       | E  | 0-56%   |

If you have a grade dispute, please resolve it with your instructor **within a week** of the assignment deadline.

**Attendance and Participation** Attendance: Attendance in lecture is strongly recommended. Students who come to class and participate are more likely to do well in the course. Excused absences are consistent with university policies in the undergraduate catalog and require appropriate documentation:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

### III. Annotated weekly schedule of course topics and assignments.

| Week | Topics   | Assignments (due dates are listed in the calendar)      |
|------|--|---|
| 1    | Introduction and terminology, Solutions and Initial Value problems, Direction Fields         | LQ1-3, HWL1-L3, Quiz L1-L3, Syllabus Quiz, Precalc Quiz |
| 2    | Euler Method, Separable DEs  | LQ4-5, HW 4-5   |
| 3    | Linear Equations, Exact Equations, Integrating Factors                                       | LQ6-8, HW 6-8, Quiz L4-L6                               |
| 4    | Substitutions, First Order Applications  | LQ9-10, HW9-10, Quiz L7-9, Practice Exam 1, Exam 1      |
| 5    | Mass Spring Oscillator, Homogenous Linear DEs, Complex Roots                                 | LQ11-13, HW 11-13, Quiz L11-13                          |
| 6    | Method of Undetermined Coefficients, Principle of Superposition                              | LQ14-15, HW 14-15                                       |
| 7    | Variation of Parameters, Variable Coefficient Equations                                      | LQ16-17, HW 16-17, Quiz L14-17                          |
| 8    | Laplace Transform Definition, Properties, Inverse Laplace Transform                          | LQ18-20, HW 18-20                                       |
| 9    | Review, Solving Initial Value Problems with Laplace Transforms                               | Practice Exam 2, Exam 2, LQ21, HW 21, Quiz L18-21       |
|      | Spring Break   | none  |
| 10   | Laplace Transforms for Discontinuous Functions, Convolution, Dirac Delta                     | LQ22-24, HW 22-24, Quiz L22-24                          |
| 11   | Taylor Polynomial, Power Series Review   | LQ25-26, HW 25-26, Quiz L25-26                          |
| 12   | Power Series Solutions, Analytic Coefficients  | Practice Exam 3, Exam 3 LQ27-28, HW 27-28, Quiz L27-28  |
| 13   | Higher Order DE Basic Theory,  | EC1-2   |
| 14   | Homogeneous DE Constant Coeff., Method of Undetermined Coefficients, Variation of Parameters | EC3-5   |
| 15   | Review   | Practice Exam 4   |

### IV. Student Learning Outcomes (SLOs).

#### Description of Graded Work

After successful completion of this course students will have demonstrated competency in the following Student Learning Outcomes (SLOs):

## Program Student Learning Outcomes Category

| Category          | Institutional Definition  | Institutional SLO   | Specific to the course   |
|-------------------|---|---|--|
| Content           | Content is knowledge of the terminology, concepts, methodologies and theories used within the subject area.   | Students demonstrate competence in the terminology, concepts, methodologies and theories used within the subject area.                              | Students will gain knowledge of terminology, approximating solutions to differential equations via graphical and computations methods, analytical methods for solving first and second order differential equations, and Taylor and power series solutions to differential equations.  |
| Critical Thinking | Critical thinking is characterized by the comprehensive analysis of issues, ideas, and evidence before accepting or formulating an opinion or conclusion. | Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the subject area. | Students will apply their knowledge to solve problems concerning topics that include, but are not limited to solving differential equations that are separable, linear, exact, exact with integrating factor, solved using substitutions, and solved by approximations including graphical, computational, and series methods. |
| Communication     | Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the subject area.       | Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the subject area. | Throughout this course students will communicate mathematical ideas through writing on quizzes and exams.  |

## VI. Policies

**Canvas Messages:** Check your messages **daily** so that you do not miss any important announcements.

**Text: Fundamentals of Differential Equations and Boundary Value Problems** by R. Kent Nagle, Edward B. Saff and Arthur David Snider, ISBN-13: 978-0321977106, ISBN-10: 9780321977106. You may use the previous edition and/or the version without boundary value problems if you prefer.

**Requirements:** A hardwired connection (not wireless) is strongly recommended when working and submitting assignments. It is the student's responsibility to have a reliable internet connection, adequate internet speed and cleared cache and cookies before starting each assignment .

**Time commitment:** University students are expected to spend at least 3 hours for each hour watching lecture videos in order to keep up with the course material.

**Content:** We will cover Chapters 1(Introduction), 2(First Order ODEs), 4(Second Order ODEs), 7(Laplace Transforms), and some of 8(Series Solutions) and 6(Higher Order DEs).

**Homework:** Doing homework is essential to success in this course and is one of the best ways to prepare for quizzes and tests. Online homework is completed in Canvas. Homework is worth 7% of the grade. The lowest two scores are dropped. Each homework has **unlimited attempts**. Students who miss parts of a multiple-part question should feel free to ask about which parts were missed.

**Lecture Quizzes:** There is a lecture quiz for each lecture with **two attempts** each. The lowest two scores are dropped. Lecture Quizzes are worth 10% of the course grade. Online quizzes are 30-50 minutes long.

**Quizzes:** There will be ten online quizzes covering 2-4 lectures with **one attempt** each. The lowest two scores are dropped. Quizzes are worth 13% of the course grade. Online quizzes are 30-50 minutes long.

**Attendance:** Attendance is recommended but not required for lectures. One section will be available via Zoom and the recorded lectures will be posted in Canvas. You can find information on UF attendance policies here. Attendance is required for exams.

**Discussion board:** There is one discussion board for each exam period. If you have a question, please show your work and state the assignment from which the problem comes. The question must not have already been asked so read the boards daily. If you ask a question that has been answered in an online conference, you will be directed to watch the video of that conference unless you require specific clarification. Discussion boards are locked at 10 PM the night before each exam.

**Practice Exams:** Four online practice exams are suggested to be completed by the dates shown in the calendar. Practice exams do not count towards the grade. Practice exams may be reviewed shortly after the due date.

**Exams:** Three evening assembly exams will be given on the dates shown in the calendar from 8:20PM-9:40PM. The fourth (final) exam is comprehensive and held on Saturday, April 27 from 5:30PM-7:30PM. Each is worth 17.5% of your grade. Bring only pencils and erasers. External aids, communication with other students during the exam, and calculators or other electronic devices are not permitted. Infractions will be reported to the Dean of Students Office. If you fail to turn in your scantron or turn in a blank scantron, your scantron will be scored as 0. If you fail to turn in the free response portion of your exam it will be scored as 0. It is your responsibility to turn in the correct and completed items when you have completed your exams.

Your grade is comprised of the following:

4 Exams 17.5% each  
Quizzes 13% (drop two lowest scores)  
Homework 7% (drop lowest two scores)  
Lecture Quizzes 10% (drop lowest two scores)  
5 Extra Credit Assignments 2% (drop lowest score)

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Total: 102% (Your maximum possible grade is 102/100).

### **Exam Coverage**

Exam 1 covers 1.1-1.4, 2.2-2.6 (L1-L9)

Exam 2 covers 4.1-4.7 (L11-L17)

Exam 3 covers 7.2-7.6, 7.8-7.9 (L18-L24)

Exam 4 is comprehensive, approximately 50% chapter 8 (L25-L28) with the remainder from chapters 1-2, 4, and 7 (L1-24).

**Accommodations for students with learning disabilities:** Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting [disability.ufl.edu/students/get-started](http://disability.ufl.edu/students/get-started)

**Academic Honesty:** The course will be conducted in accord with the University honor code and academic honesty policy which can be found at [www.dso.ufl.edu/sccr/honorcodes/honorcode.php](http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php). External aids, communication with other students during exams, and calculators are not permitted. Infractions will be reported to the Dean of Students Office. The Mathematics Department expects you to follow the Student Honor Code. We are bound by university policy to report any instance of suspected cheating to the proper authorities.

In addition, we remind you that lectures and the lecture notes given in this class are the property of the University/faculty member and may not be taped/shared without prior permission from the lecturer and may not be used for any commercial purpose. Students found to be in violation may be subject to discipline under the Student Conduct Code.

**Makeup Exams:** If you miss an exam with valid documentation, you may take a makeup. If you miss without valid documentation, there will be a 20% penalty. Valid documentation includes documented illness, school-sponsored activity, death in the immediate family, court-ordered or military appointments, and religious holidays. Scheduled flights do not count as valid documentation so do not make plans for a flight which conflicts with exam dates and times. If you miss a second exam, the comprehensive fourth exam will replace it. Exam makeups are held on Tuesday, November 28 from 8:20-10PM.

If you have a **conflict with another assembly exam in a course that has a higher course number or a religious observance on an exam date**, please request your exam makeup **within the first two weeks of the semester** to qualify for a makeup.

If illness or other extenuating circumstances cause you to miss an exam, contact the course coordinator immediately (no later than 24 hours after the exam) by email. Then, as soon as possible after you return to campus, bring the appropriate documentation to the course coordinator.

To be eligible for a make-up you must have completed at least 75% of the course work that has been given so far. **Any and all students who request exam makeups for any reason must complete the appropriate "Request for Makeup Exam" assignments in Canvas** and attach appropriate documentation.

**Late submissions:** Due date is not do date! Please do not wait begin your assignments the day that they are due. If there are any last minute difficulties with your computer or access, you will be out of luck. Homework,

lecture quizzes, and quizzes can be submitted late with a 25% penalty for each day beyond the due date. If documented illness or other extenuating circumstances cause you to miss a deadline for an assignment you will be granted penalty removals for quizzes only. You must contact the course coordinator for details. **There are no late penalty removals for homework or lecture quizzes.**

**False Late Penalties:** If you revisit past due assignments that you previously submitted on time, Canvas automatically confers late penalties. These must be removed by hand. Rather than revisiting past-due assignments, keep written records of your solutions and review them.

**Evaluations:** Course evaluations are now at <https://gatorevals.aa.ufl.edu/> Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/> Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/publicresults/>

**Privacy:** Our class sessions, including office hours, may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded.

If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

**In-Class Recordings:** Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session. Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

**Diversity:** The Mathematics Department is committed to diversity and inclusion of all students. We acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements. It is our intent to present materials and activities that are respectful of diversity: race,

color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.

## VII. Campus Resources:

**Health and Wellness U Matter, We Care:** If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

**Counseling and Wellness Center:** Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services. Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

**University Police Department:** Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

**UF Health Shands Emergency Room / Trauma Center:** For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

**GatorWell Health Promotion Services:** For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

**Academic Resources E-learning technical support:** Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu). Student Health Care Center website.

**Student Health Care Center:** Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

**Career Connections Center:** Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

**Library Support:** Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center:** Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420.

**General study skills and tutoring.** Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

**Student Complaints On-Campus:** Visit the Student Honor Code and Student Conduct Code webpage for more information.

## VIII. Tentative Calendar Due Dates and Lecture Schedule

Tentative due dates (subject to possible revision)

| Mon             | Tues            | Wed                                     | Thur         | Fri                         |
|-----------------|-----------------|---|--------------|-----------------------------|
| Jan 8           | 9               | 10                                      | 11           | 12                          |
|                 |                 | HW1/LQ1<br>Syllabus Quiz/Precalc Review |              | HW2/LQ2                     |
| 15              | 16              | 17                                      | 18           | 19                          |
| holiday         |                 | HW3/LQ3                                 | Q1(L1-3)     | HW4/LQ4                     |
| 22              | 23              | 24                                      | 25           | 26                          |
| HW5/LQ5         |                 | HW6/LQ6                                 | Q2(L4-6)     | HW7/LQ7                     |
| 29              | 30              | 31                                      | Feb1         | 2                           |
| HW8/LQ8         |                 | HW9/LQ9Q3(L7-9), PE1                    | Exam1 (L1-9) |                             |
| 5               | 6               | 7                                       | 8            | 9                           |
|                 |                 | HW10/LQ10                               |              |                             |
| 12              | 13              | 14                                      | 15           | 16                          |
|                 |                 | HW11/LQ11                               |              | HW12/LQ12                   |
| 19              | 20              | 21                                      | 22           | 23                          |
| HW13/LQ13       | Q4(L11-13)      | HW14/LQ14                               |              | HW15/LQ15                   |
| 26              | 27              | 28                                      | 29           | Mar 1                       |
| HW16/LQ16       | Q5(L14-15)      |   |              | HW17/LQ17                   |
| 4               | 5               | 6                                       | 7            | 8                           |
| Q6(L16-17)      | PE2             | Exam 2 (L11-17)                         |              | HW18/LQ18                   |
| 11              | 12              | 13                                      | 14           | 15                          |
| holiday         | holiday         | holiday                                 | holiday      | holiday                     |
| 18              | 19              | 20                                      | 21           | 22                          |
| HW19/LQ19       |                 | HW20/LQ20                               |              | HW21/LQ21                   |
| 25              | 26              | 27                                      | 28           | 29                          |
| HW22/LQ22       | Q7(L18-21)      | HW23/LQ23                               |              | HW24/LQ24<br>PE3/Q8(L22-24) |
| Apr 1           | 2               | 3                                       | 4            | 5                           |
| Exam 3 (L18-24) |                 |   |              | HW25/LQ25                   |
| 8               | 9               | 10                                      | 11           | 12                          |
| HW26/LQ26       | Q9(L25-26)      | HW27/LQ27                               |              | HW28/LQ28                   |
| 15              | 16              | 17                                      | 18           | 19                          |
| EC1             | Exam 1-3 makeup | EC2                                     |              | EC3                         |
| 22              | 23              | 24                                      | 25           | 26                          |
| EC4             | Q10(L27-28)     | EC5, PE4                                | Reading      | Reading                     |

HW: 28 homework (unlimited attempts, drop 2 lowest) due 11:59 PM

LQ: 28 lecture quizzes (2 attempts, drop 2 lowest) due 11:59 PM

Q: 10 quizzes (1 attempt, drop 2 lowest) due 11:59 PM

PE: 4 practice exams (unlimited attempts) not for credit

Final Exam date (L1-28): Saturday, April 27 5:30PM-7:30PM

## Tentative Lecture Schedule (subject to possible revision)

| Mon                        | Tues              | Wed                                | Thur         | Fri             |
|----------------------------|-------------------|------------------------------------|--------------|-----------------|
| Jan 8                      | 9                 | 10                                 | 11           | 12              |
| Intro/L1                   |                   | L2<br>Syllabus Quiz/Precalc Review |              | L3              |
| 15                         | 16                | 17                                 | 18           | 19              |
| holiday                    |                   | L4                                 | Q1(L1-3)     | L5              |
| 22                         | 23                | 24                                 | 25           | 26              |
| L6                         |                   | L7                                 | Q2(L4-6)     | L8              |
| 29                         | 30                | 31                                 | Feb1         | 2               |
| L9                         | Q3(L7-9)          | Review                             | Exam1 (L1-9) | L10             |
| 5                          | 6                 | 7                                  | 8            | 9               |
| L11                        |                   | L12                                |              | L13             |
| 12                         | 13                | 14                                 | 15           | 16              |
| L14                        |                   | L14                                |              | L15             |
| 19                         | 20                | 21                                 | 22           | 23              |
| L16                        | Q4(L11-13)        | L17                                |              | L17             |
| 26                         | 27                | 28                                 | 29           | Mar 1           |
| L18                        | Q5(L14-15)        | L19                                |              | L20             |
| 4                          | 5                 | 6                                  | 7            | 8               |
| Review                     | PE2<br>Q6(L16-17) | Review,<br>Exam 2 (L11-17)         |              | L21             |
| 11                         | 12                | 13                                 | 14           | 15              |
| holiday                    | holiday           | holiday                            | holiday      | holiday         |
| 18                         | 19                | 20                                 | 21           | 22              |
| L22                        |                   | L23                                | Q7(L18-21)   | L24             |
| 25                         | 26                | 27                                 | 28           | 29              |
| L25                        |                   | L26                                | Q8(L22-24)   | Catch up/Review |
| Apr 1                      | 2                 | 3                                  | 4            | 5               |
| Review,<br>Exam 3 (L18-24) |                   | L27                                |              | L28             |
| 8                          | 9                 | 10                                 | 11           | 12              |
| L28                        | Q9(L25-26)        | EC1                                |              | EC2             |
| 15                         | 16                | 17                                 | 18           | 19              |
| EC3                        | Exam 1-3 makeup   | EC4                                |              | EC5             |
| 22                         | 23                | 24                                 | 25           | 26              |
| Review                     | Q10(L27-28)       | Review                             | Reading      | Reading         |

## IX. Lecture Topics and Tentative Book HW for extra practice (not collected for grade)

| Ed. |                                 | 7th (mechanical clock)                   | 6th (apple)                             |
|-----|---------------------------------|--|---|
| Lec | section                         | problems                                 | problems                                |
| 1   | 1.1 Background                  | 1-11 odds                                | same                                    |
| 2   | 1.2 Solutions and IVPs          | 1-11 odds, 21-27 odds                    | same                                    |
| 3   | 1.3 Direction Fields            | 1-7 odds, 11-17 odds                     | same                                    |
| 4   | 1.4 Euler Method                | 1,3,5, take two steps only               | same                                    |
| 5   | 2.2 Separable                   | 1-25 odds                                | same                                    |
| 6   | 2.3 Linear                      | 1-21 odds                                | same                                    |
| 7   | 2.4 Exact                       | 1-25 odds                                | same                                    |
| 8   | 2.5 Exact w/ Integrating Factor | 1-11 odds                                | same                                    |
| 9   | 2.6 Substitutions               | 1-27 odds                                | same                                    |
| 10  | 1st order apps                  | 2.4 33, 3.2 23-25 3.3 1-5 odds           | same                                    |
| 11  | 4.1 Mass Spring Oscillator      | 1-9                                      | same                                    |
| 12  | 4.2 Linear 2nd Order            | 1-19 odds, 27-31 odds                    | same                                    |
| 13  | 4.3 Complex Roots               | 1-25 odds                                | 1-17 odds, 21-25 odds                   |
| 14  | 4.4 Undetermined Coefficients   | 1-25 odds, 27-31 odds                    | same                                    |
| 15  | 4.5 Superposition               | 9-35 odds                                | 11-19 odds, 23-25 odds, 31-35 odds      |
| 16  | 4.6 Variation of Parameters     | 1-9 odds,11                              | same                                    |
| 17  | 4.7 Variable Coefficients       | 1-13 odds,19-20,41-44                    | 1-13 odds,19-20,37-39 odds, 45-47 odds  |
| 18  | 7.2 Laplace Transform           | 1-19 odds                                | same                                    |
| 19  | 7.3 Properties                  | 1-9 odds,13-17 odds, 25                  | same                                    |
| 20  | 7.4 Inverse Laplace Transform   | 1-25 odds                                | same                                    |
| 21  | 7.5 Solving IVPs                | 1-7 odds, 12, 15-23 odds                 | same                                    |
| 22  | 7.6 Discontinuous Functions     | 1-17 odds, 21-23 odds, no sketch         | 1-17 odds                               |
| 23  | 7.8 Convolution                 | 1-21 odds, 23, 25                        | <b>7.7</b> 1-21 odds, 23, 25            |
| 24  | 7.9 Dirac delta                 | 1-17 odds, no sketch, 25, 27             | <b>7.8</b> 1-17 odds, no sketch, 25, 27 |
| 25  | 8.1 Taylor Polynomial           | 1-5 odds, 9a                             | same                                    |
| 26  | 8.2 Power Series                | 1-5, odds, 11-13 odds,17-27 odds, 29, 33 | same                                    |
| 27  | 8.3 Power Series Solutions      | 1-27 odds                                | same                                    |
| 28  | 8.4 Analytic Coefficients       | 1-15 odds                                | same                                    |