

**Disclaimer:** All items on this syllabus are subject to change. Any in-class announcement, verbal or written, is considered an official addendum to this syllabus. All course materials and information will be accessible through Blackboard Academic Suite (link on your “My ASU” page).

<b>Instructor:</b>	<b>Office:</b>
<b>Phone:</b>	<b>Office Hours:</b>
<b>E-Mail:</b>	<b>Prerequisites:</b> MAT 266 or MAT 271 with a grade of C or higher.
<b>Class time:</b>	<b>Classroom:</b>

**Textbook:** *Elementary Differential Equations and Boundary Value Problems*, 11th Edition, by William E. Boyce and Richard C. DiPrima, John Wiley & Sons, Inc. There is also ASU custom edition of this textbook: MAT 275 – *Modern Differential Equations*.

**Course Description:** Introduces differential equations, theoretical and practical solution techniques. Applications. Problem solving using MATLAB.

**Learning outcomes:** At the completion of this course, students will be able to, among other things:

- Sketch and interpret direction fields for first order Ordinary Differential Equations (ODEs) and sketch integral curves
- Find equilibrium (constant) solutions of autonomous ODEs and classify them as stable, unstable or semi-stable.
- Verify, by substitution, that a given function is a solution of a given ODE
- Given the general solution of a ODE, use initial conditions to find the particular solution.
- Classify differential equations by their order and linearity
- Derive differential equations that model simple applied problems.
- Use the method of integrating factor to integrate linear first order ODEs.
- Solve separable equations and determine the interval of validity of the solution.
- Given a first order Initial Value Problem (IVP), use the appropriate theorems to determine existence and uniqueness of solutions.
- Use Euler’s method to derive recursive approximations for a given IVP.
- Use the characteristic equation to solve linear homogeneous ODEs with constant coefficients.
- Use the Wronskian to determine linear independence of solutions of high order DEs.
- Apply the method of reduction of order for solving linear second order DEs.
- Apply the method of undetermined coefficients for finding a particular solution of non-homogeneous DEs.
- Derive and interpret solutions of ODES modeling damped and undamped mechanical vibrations with or without forcing term.
- Compute Laplace transform using the definition and/or using the table.
- Solve ODEs using the Laplace transform.
- Write a piecewise function in terms of unit step functions and solve ODEs involving piecewise continuous forcing terms.
- Use the Laplace transform to solve ODEs involving the impulse function
- Write a linear system of differential equations in vector-matrix form.
- Write higher order linear ODEs as a first order system of ODEs.
- Use the Wronskian to determine whether solutions of a linear system of a DE are linearly independent.
- Use the eigenvalue method to solve homogeneous linear system of ODEs with constant coefficients.
- Use MATLAB ODE solvers to solve IVPs.

## TENTATIVE SCHEDULE

<i>Week</i>	<i>Dates</i>	<i>Sections</i>	<i>Comments</i>
1	8/22-8/23	1.1 Some Basic Models; Direction Fields 1.2 Solutions of Some Differential Equation	
2	8/26- 8/30	1.3 Classification of Differential Equations 2.1 Linear Equations; Method of Integrating Factors 2.2 Separable Equation	Drop/Add deadline Wed. 8/28 <b>Matlab Lab 0 due Friday 8/30</b>
3	9/2-9/6	2.3 Modeling with First Order Equations 2.5 Autonomous Equations and Population Dynamics	<b>Matlab Lab 1 due Friday 9/6</b> Labor Day: Monday 9/2
4	9/9-9/13	2.7 Numerical Approximations: Euler's methods 8.2 Improvements on the Euler Method	
5	9/16- 9/20	2.4 Difference between linear and nonlinear equations 3.1 Homogeneous Equations with Constant Coefficients	<b>Matlab Lab 2 due Friday 9/20</b>
6	9/23-9/27	3.2 Solutions of Linear Homogeneous Equations; The Wronskian 7.1 Introduction to Linear First Order Systems	
7	9/30 -10/4	<b>TEST 1 (Wed or Thursday, 10/2 or 10/3)</b> 3.3 Complex roots of the Characteristic Equation	<b>Matlab Lab 3 due Friday 10/4</b>
8	10/7-10/11	3.4 Repeated Roots, Reduction of Order 3.7 Mechanical and Electrical Vibrations	
9	10/14-10/18	3.5 Method of Undetermined Coefficients 3.8 Forced Vibrations	Fall Break: Monday 10/14-Tuesday 10/15
10	10/21 -10/25	3.8 Forced Vibrations 6.1 Definition of the Laplace Transform	<b>Matlab Lab 4 due Friday 10/25</b>
11	10/28-11/1	6.2 Solution of Initial Value Problem 6.3 Step Functions	
12	11/4 -11/8	6.4 Differential equation with Discontinuous Forcing Functions 6.5 Impulse Function	Course withdrawal deadline: Wed. 11/6 <b>Matlab Lab 5 due Friday 11/8</b>
13	11/11-11/ 15	Review <b>TEST 2 (Wed or Thursday, 11/13 or 11/14)</b>	Veteran's Day: Monday. 11/11
14	11/18-11/22	7.2 Review of Linear Algebra 7.3 Linear Algebraic Equations; Linear Independence, Eigenvalues, Eigenvectors	<b>Matlab Lab 6 due Friday 11/22</b>
15	11/25-11/29	7.5 Homogeneous Linear Systems with Constant Coefficients 7.6 Complex Eigenvalues	Thanksgiving Holiday: Thur. 11/28 – Fr. 11/29
16	12/2-12/6	7.8 Repeated Eigenvalues (6.6) The convolution Integral (7.7) The Fundamental Matrices	.
17	12/9-12/14	Final Exam – See Final Exam Schedule, Room TBD	

**Software:** MATLAB will be used for lab assignments and is available for free (see below for details).

**Calculator:** A graphing calculator (e.g. TI-84) is recommended. Calculators that perform symbolic manipulation (e.g. TI-89, TI-92, TI-Inspire CAS) are not allowed for tests and quizzes.

**Attendance:** Attendance is mandatory! Your instructor reserves the right to take attendance and to incorporate your attendance as part of your overall grade.

**Grading:** The grade will be computed from the Final exam (30%), 2 Midterm Tests (20% each), and Labs/Quizzes/HW (30%).

**Grading Scale:**

A-, A, A+: 90-92.9, 93-96.9, 97-100% ;  
C, C+: 70-75.9, 76-79.9%;

B-, B, B+: 80-82.9, 83-86.9, 87-89.9% ;  
D 60%–69.9%; E: 59.9% or less

**TESTS/QUIZZES/HOMEWORK//LABS**

15%	<b>Quizzes/Homework:</b> Quizzes may be given in class unannounced. No make ups. The homework will be through WeBWorK, an on-line homework system that gives students instant feedback on their answers. The URL is <a href="http://webwork.asu.edu/">http://webwork.asu.edu/</a> . <b>No extensions will be given.</b>
15%	<b>MATLAB LABS:</b> There will be six MATLAB lab reports due during the semester. The instructional videos for the labs and the pdf files with the exercises are posted at <a href="https://math.la.asu.edu/~tracogna/MAT275/LAB_VIDEOS">https://math.la.asu.edu/~tracogna/MAT275/LAB_VIDEOS</a> .  Please check this site as soon as possible. The due dates for the lab reports are listed in the syllabus. Students should watch the videos on their own. A Teaching Assistant will be in ECA221 on your scheduled lab time to provide help if needed (note that lab times do not coincide with normal lecture times). There will also be open lab hours in the evening in ECA 221. <u>You are not required to purchase MATLAB.</u> All ASU students can download MATLAB through MyApps.
40%	<b>Two Midterm Tests</b> Test 1: <b>Wed or Thursday, 10/2 or 10/3</b> in class. (Sections 1.1-1.3, 2.1-2.5, 2.7, 3.1, 3.2, 7.1). Test 2: <b>Wed or Thursday, 11/13 or 11/14</b> in class (Sections 3.3-3.8, 6.1-6.5). Calculators that perform symbolic algebra are not allowed.
30%	<b>Final Exam.</b> Comprehensive. Check the schedule of Finals. Location TBA. Your instructor will announce the location once it has been set. There will be no make-ups given for the final, and no finals will be rescheduled for personal reasons, including non-refundable airplane tickets.

**Piazza:** We will be using the discussion board “Piazza” for questions about the course. The system is highly catered to getting you help fast and efficiently from classmates and the instructor. Prior to posting a question, please check the syllabus, announcements and existing posts. If you do not find an answer, post your question. You are encouraged to respond to questions of your classmates. It is recommended you enroll in Piazza even if you do not have any questions, as you might benefit from the posts of your classmates and instructor. Sign up link: [????](#)

**Homework:** We will use WeBWorK, an online homework system (at no additional fee!). WeBWorK can be accessed at <http://webwork.asu.edu>. ***No late assignments will be accepted.*** Due dates appear on WeBWorK. Each HW problem weighs equally.

**Suggested Problems:** The textbook has answer keys for all problems. All problems, or at least odd numbered problems are suggested for your exercise. Many exam problems are similar to textbook problems and/or WeBWorK exercises. In addition, there are practice exam problems at <https://math.asu.edu/resources/math-courses/mat275>.

**ASU Video Lessons:** The websites <https://vidman.asu.edu/index.php/menu> and [https://math.la.asu.edu/~surgent/video/mat275\\_exp.html](https://math.la.asu.edu/~surgent/video/mat275_exp.html) contain video lessons for the course. The former website is more recently updated, while on the latter the videos are a bit better organized. You are encouraged to use this as a supplement for the lecture.

**Matlab Labs:** There will be a total of **seven** MATLAB computer labs. The first lab, Lab 0, will be extra credit and worth half the amount of the other labs. The weeks on which these labs are due are listed on the schedule in this syllabus. However, these dates may be subject to change. You are not required to purchase Matlab. ASU students can download Matlab for free. Go to MyASU→MyApps and then search for Matlab to download it to your computer. In addition, Matlab is installed on campus computers (NSE Library, computer labs, etc.) so you can use it there. The instructional videos for all the labs and the pdf files

with the exercises are available through your course canvas shell. Please check this site as soon as possible. School of Math & Stat Sciences offers help on Matlab (open evening lab hours in ECA 221).

The due dates for the lab reports are listed in the syllabus. Students should watch the videos on their own. A Teaching Assistant will be in ECA 221 on your scheduled lab time to provide help if needed (note that lab times do not coincide with normal lecture times). Their schedule will also be posted within the Canvas course shell for your specific class.

**Tutoring:** The following sites provide free tutoring to all ASU students:

- [The Math Tutoring Center](#)
- [Engineering Tutoring Center](#)
- [The Math Community Center](#)
- [University Academic Success Program](#)
- Students can also visit <https://tutoring.asu.edu> and utilize Tutor Search to select their course and the times they are available to find a specific tutor that can assist them.

**Attendance:** Attendance is mandatory! Your instructor reserves the right to take attendance and to incorporate your attendance as part of your overall grade. For classes that meet two days a week, the maximum number of absences is four. Students who exceed the number of allowed absences will receive a grade of EN. There are no “excused” absences other than for school-sanctioned activities or religious holidays.

**Cell Phones and Electronic Devices:** Any student who accesses for any reason a phone or any internet-capable device during an exam will automatically receive a score of zero on the exam. All such devices must be turned off and put away and made inaccessible during the exam.

#### **Course Policies:**

- Students are responsible for assigned material whether or not it is covered in class. Students are responsible for material covered in class whether or not it is in the text. Working regularly on assigned problems and *attending class* are essential in order to do well. Expect to spend at least 6-10 hours weekly on homework/labs. You are expected to read the text, preferably before the material is covered in class.
- Make-up exams are at the discretion of the instructor and only in case of documented emergency. In any case, no make-up exams will be given unless the student has notified the instructor through email before the test is given.
- Quizzes are given in class unannounced. No late HW will be accepted and no make-up quizzes will be given.
- Arriving late to class will not be tolerated.
- All E-mail communication must be done from your ASU account. E-mails received from other accounts will not be answered.
- The course content, including lecture notes, is copyrighted material and students may not sell notes taken during the conduct of the course (see [ACD 304-06](#), “Commercial Note Taking Services”.)

**Proctoring Statement:** Students in face-to-face or online courses taking exams and quizzes at Arizona State University should expect to be proctored. The process includes verifying the identity of the student and providing either live proctors or other forms of proctoring during the exam or quiz. In the case of face-to-face courses, students can be required to show a valid identification card, and expect to be monitored by proctors while taking either an exam or quiz.

**EXAM POLICIES:** Your calculator memory may be randomly viewed during an exam and will be cleared if anything suspicious is written therein. The instructor has the right to regard finding suspicious material in your calculator memory as cheating. The exams are closed book and no notes are allowed. Bringing unauthorized “cheat sheets” or any other material in class during an exam is considered cheating. The faculty holds the highest standard of academic integrity. If a student is caught cheating, the sanction can be anything from a lowered grade on an assignment to expulsion from ASU. ASU has a grade of “XE” which can become part of a transcript and permanent academic record and explicitly means that the student failed a course because of academic dishonesty. For more information on ASU policies, visit: <https://provost.asu.edu/academic-integrity/policy>. There are no retakes or “corrections”, and no lowest grade will be dropped, not will your receive extra credit assignments to erase the consequences of a bad test.

**Classroom behavior:** Classroom disturbances, including but not limited to: arriving late, talking in class and using cellular devices are not tolerated. The use of recording devices is prohibited. Each student is expected to show respect for every student registered in the course. An instructor may withdraw a student from a course when the student's behavior disrupts the educational process under [SSM 201-10](#)

Threatening behavior will be handled according to the Student Service Manual, [SSM 104-02](#).

Students are required to adhere to the ABOR Student [Code of Conduct](#), Academic Affairs Manual ACD 125 [Computer, Internet and Electronic Communications](#), and the ASU Student [Academic Integrity Policy](#).

**Studying for the class:** While diligent, timely completion of the online homework assignments is necessary to master procedural skills, this alone is usually not sufficient to gain conceptual understanding. To master the concepts, you must: review and study your class notes and/or the textbook thoroughly with the goal to understand the connections between the concepts; and create your own lists of definitions and theorems and commit them to memory like you would do with vocabulary in any language. You must do all this continuously throughout the semester. You must have learned the definitions and theorems covered in each class session and started the corresponding section of the online homework by the time of the next class session. Failure to know the material covered in lectures will result in your inability to follow subsequent lectures, and the difference between where you are in your understanding and where you should be will be compounded with each lecture. Relying on “just in time” cramming for exams is an ineffective study technique and will virtually guarantee failure in the class.

### **SoMSS and University Policies and Procedures**

For semester deadlines related to enrollment, withdrawal or payments, see the academic calendar available at <https://students.asu.edu/academic-calendar>

**Instructor-Initiated Drop:** At the instructor's discretion, any student who has not attended class during the first week of classes may be administratively dropped from the course. However, students should be aware that non-attendance would NOT automatically result in being dropped from the course. Thus, a student should not assume they are no longer registered for a course simply because they did not attend class during the first week. It is the student's responsibility to be aware of their registration status.

**Course Withdrawal:** A student may withdraw from a course with a grade of W during the withdrawal period. The instructor's signature is not required. It is a student's responsibility to verify that they have in fact withdrawn from a class.

**Final Exam Make Up Policies:** The [final exam schedule](#) will be strictly followed. Except to resolve those situations described below, no changes may be made in this schedule without prior approval of the Dean of the college in which the course is offered. Under this schedule, if a conflict occurs, or a student has more than three exams on one day, the instructors may be consulted about an individual schedule adjustment. If necessary, the matter may be pursued further with the appropriate dean(s). This procedure applies to conflicts among any combination of Downtown Phoenix campus, Tempe campus, Polytechnic campus, West campus, and/or off campus class. Make-up exams will NOT be given for reasons of a non-refundable airline tickets, vacation plans, work schedules, weddings, family reunions, and other such activities. Students should consult the final exam schedule before making end-of-semester travel plans. Exceptions to the schedule and requests for make-up examinations can be granted only by the Department Chair, Associate Department Chair or the Director of First Year Mathematics, and for one of the following reasons:

1. Religious conflict (e.g., the student celebrates the Sabbath on Saturday)
2. The student has more than three exams scheduled on the same day as the math final
3. There is a time conflict between the math final and another final exam.

#### **Early Examination Requests (Reference: [ACD 304-01](#))**

Requests for early final examinations may not be granted by instructors. Requests that seem to have merit may be referred to the dean of the college in which the student is enrolled. If the dean finds that a student must leave early because of circumstances beyond the student's control, the dean may authorize arrangements whereby the student can complete the course work and take the final examination before leaving. Ordinarily, however, it will be necessary for the dean to advise the student to clear with each instructor and arrange for an “incomplete” grade in each course. Under the policy covering “incompletes,” the student must arrange to complete the course work and take the final examination within one calendar year. If the student is unable to return to the university to take a final examination for the removal of the “incomplete,” the dean may make arrangements for the student to take the final elsewhere, under reliable supervision.

**Incomplete:** A grade of incomplete will be awarded only in the event that a documented emergency or illness prevents the student who is doing acceptable work from completing a small percentage of the course requirements. The guidelines in the current [Student Service Manual](#) regarding a grade of incomplete will be strictly followed. The form for an incomplete request is at <https://students.asu.edu/forms/incomplete-grade-request>

Once the student completes their part, they should bring it to the instructor for approval.

**Absences related to religious observance/practices or university sanctioned events and activities:** if you will be absent from class due to a religious observance or practice that are in accordance with [ACD 304-04](#), or from participation in a university sanctioned event/activity in accord with [ACD 304-02](#), it is your responsibility to inform the instructor during the first week of class. Your instructor will work with you on alternative and reasonable arrangements for any time missed.

**Academic Integrity:** Academic honesty is expected of all students in all assignments, examinations, papers, laboratory work, academic transactions and records. Academic dishonesty, including inappropriate collaboration, will not be tolerated. There are severe sanctions for cheating, plagiarism, and any other form of dishonesty. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty

(indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see <http://provost.asu.edu/academicintegrity> and <https://provost.asu.edu/sites/default/files/AcademicIntegrityPolicyPDF.pdf>)

**Ethics:** Grades are based only on academic work and are calculated using the same criteria for all students. It is highly unethical to bring to your instructor's attention the possible impact of your mathematics grade on your future plans, including graduation, scholarships, jobs, etc. The instructor may exercise an option to withdraw you from the course if they think you are compromising the ability to assess your work independently of any other consideration.

**Title IX:** Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.

**Disability Accommodations:** Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests to me at the beginning of the semester either during office hours or by appointment. Please schedule an appointment to see if you have a disability that will require accommodations in this class. **Note:** Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. Disability information is confidential.

**Establishing Eligibility for Disability Accommodations:** Students who feel they will need disability accommodations in this class but have not registered with the Disability Resource Center (DRC) should contact DRC immediately. Their office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: 480-965-1234 (V), 480-965-9000 (TTY). For additional information, visit: <http://www.asu.edu/studentaffairs/ed/drc>. Their hours are 8:00 AM to 5:00 PM, Monday through Friday. Please complete this process as soon as possible and schedule an appointment to see me during office hours if you have a disability that will require accommodations in the Disability Resource Center.