MAP 2302 Syllabus and course information

Syllabus and course information

Honors Elementary Differential Equations
MAP 2302 Section 4219 (22792)
Spring 2024
MWF 8th period (3:00–3:50 p.m.), Little 233

[Link to class home page](#)

- Instructor: [Dr. David Groisser](#). All first-person pronouns (I, me, my, etc.) refer to Dr. Groisser.

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Prerequisite: MAC 2312 or equivalent. You will need a good working knowledge of Calculus 1 and 2 (as well as precalculus algebra and trigonometry). In particular, you will be expected to know integration techniques; the chain rule; partial fractions; and the algebra, calculus, and general properties of sines, cosines, and exponentials. **If you are weak in any of these areas, or it's been a while since you took calculus, you will need to spend extra time reviewing or relearning that material. Mistakes in prerequisite material will be graded harshly on exams.**

Prior knowledge of partial derivatives (usually covered in Calculus 3) is not a prerequisite but is helpful.

Syllabus (course content): This course is an introduction to *ordinary differential equations* (ODEs). ODEs enable a mathematical description of the laws of simple physics and virtually every science. We will cover chapters 1, 2, 4, and 6–8 of the textbook, with some omissions, and some material may be presented differently (and in a different order) from the way it's presented in the book. The content we cover will be similar to that of the non-honors sections, but with some enhancements and some omissions.

"Honors at the collegiate level is a *challenge,* not a *reward.*" (https://www.honors.ufl.edu/about/) Concepts, definitions, and some theorems will be important in this honors section, in addition to techniques for solving ODEs. Topics will include:

- concept of "ordinary differential equation" and meaning of "solution";

- statement and understanding of the fundamental existence/uniqueness theorem for solutions to initial-value problems;

- methods for solving first-order differential equations (including linear, separable, and exact equations);

- some of the general theory of linear differential equations;

- second-order constant-coefficient linear differential equations as a model (having predictive value) for certain real-world physical systems;

- methods for solving second-order linear ODEs (with the constant-coefficient case), including the method of undetermined coefficients and the variation-of- parameters method;

- methods for solving, higher-order linear ODEs, primarily the constant-coefficient case;

- method of Laplace transforms, and/or power-series solutions of ODEs.
  (We will cover at least one of these two completely different topics. Time permitting, we will cover both.)

Textbook: Nagel, Saff, and Snider, *Fundamentals of Differential Equations,* 9th edition.

Note: The book above consists of the first ten chapters of a longer book: Nagel, Saff, and Snider, *Fundamentals of Differential Equations and Boundary Value Problems,* 7th edition. For these ten chapters, the two books are *identical*, page by page. Therefore if you bought the 7th edition of the longer book (instead of the 9th edition of the shorter book), you're okay.

There will also be some required readings from notes by Dr. Groisser. These notes will be linked to the Miscellaneous Handouts page.

***Tentative, approximate* weekly schedule of lectures:** Click here.

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Communicating with Dr. Groisser outside class

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For anything that needs a response, **the primary way to communicate with me outside class is to <u>see me in office hours</u>**.

- **Office Hours:**
  Monday 5th period (11:45-12:35), Wednesday 6th period (12:50-1:40), and Friday 9th period (4:05-4:55). My office is Little Hall 308. Please arrive early in the period or let me know to expect you later; otherwise I may not stay in my office for the whole period.
  *I may **require** you to wear a mask at all times in my office,* since Little 308 is a small, poorly ventilated room in which I spend most of my workday.

  See also the <u>statement concerning office hours</u> in the <u>attendance policy</u>.

  If you have the flu or similar contagious disease, or think you might, please do not come to my office. If you need to speak with me at such a time, we can set up a virtual meeting.

  If you have conflicts with all these hours, please let me know **early in the semester** (even if you don't need to meet with me soon); I may change one of the time-slots. Students who can't make **any** of my scheduled office hours may see me by appointment on most weekdays (but *never on a Thursday*). See <u>Scheduling appointments with Dr. Groisser outside office-hours</u>, later in this document. But I don't want to find myself making appointments every week; I'd rather change my regularly scheduled hour(s)—hence the importance of letting me know **early in the semester** whether you can't make any of the hours I've listed above.

- **Emailing me.**

  I receive a ton of email, and replying is very time-consuming, so please be aware of the following:

  - **THE EXISTENCE OF EMAIL DOES NOT EXTEND MY OFFICE HOURS.**

  - **EMAIL IS NOT A SUBSTITUTE FOR SEEING ME IN OFFICE HOURS.**

  - **I don't answer email that lacks an *informative* subject line and the sender's full name.** Students should also state **which of my classes they're in** (but this may be done in the body of the email rather than the subject line).

  - **I will not answer math questions by email.** An interactive conversation is needed.

  - **There are many non-math questions that I won't answer by email either.** In particular, I usually won't respond to email that asks questions that have already been answered in items you should have read (for example: this syllabus, the class home page, homework page(s), solutions handouts, emails I've sent to the class, and announcements I've posted in Canvas), or that were answered in a lecture or discussion that the student *elected* to miss for unapproved reasons, or that should be (or should have been) asked in office hours.

  - For student emails that deserve individual replies, in general I reply **only during my next office hour** or as soon thereafter as I can. (As stated earlier, "The existence of email does not extend my office hours.") Students who email me a question on a day I have an office hour, and don't explain why they're emailing me instead of attending my office hour, usually will not receive a response.

  - I don't provide individualized grade information by email.

  - I won't open attachments (or follow links) that look suspicious to me. I generally delete, without fully reading, any email that contains these.

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- My email address is located here.

Some examples of email-content that would be **okay** to send me are:

  - "The link for [this item] on [this page] seems to be broken [or: takes me to the wrong page]."
  - "I think there's a typo in the homework assignment. You listed exercise 1.2/3g, but exercise 1.2/3 doesn't have a part (g). Would you please clarify what you intended to assign?"
    For clarifications to homework assignments, I'll usually take action ASAP after seeing your message. But once I'm done with my fix, I may only send the entire class message about the update (or post one), rather than replying to the individual student(s) who notified me of the problem.
  - "I'm planning on coming to your office hour tomorrow, but I can't get there till 30 minutes after it starts. I just wanted to let you know to expect me late."
  - "I won't be in class on such-and-such date, for such-and-such reason."
  - "I'm applying for a summer program [or scholarship, graduate school, etc.]. Would you be willing to write a letter of recommendation for me? The deadline is [month/day]."

- **Communications *from* me.** You are required to read fully, and reasonably promptly, any communications from me. These communications include, but may not be limited to, emails (either to the class listserv or to you personally) and announcements on Canvas.

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Graded components of course. Your final grade will be determined by:

- Three midterms (50-minute exams), each counting for 20% of final grade.
- A cumulative final exam (two hours), counting for 40% of final grade.

I reserve the right to adjust the above percentages in individual cases, to a student's benefit, if I feel that circumstances warrant. **I will not answer any questions about hypothetical situations in which I might do this.**

Exam dates

- *Tentative* dates of the midterms are Feb. 5 (Mon.), Mar. 1 (Fri.), and Apr. 3 (Wed.). **These dates are *estimates* and are subject to change.** I will always give you at least a week's notice (minus a few hours) before an exam. **Do not, under any circumstances, use these tentative exam-dates as a guide to plan dates that you think you do not "need" to be in class, e.g. if you are thinking of being out of town on any days that are not UF holidays.** (See "Attendance Policy" and "What if you miss an exam?" below.) **Expect a grade of 0 on an exam that you miss because you planned to be out of town on the date that the exam ends up being given. This includes the day before spring break!**

- The final exam will be given Thursday May 2, starting at 3:00 p.m., in our usual classroom. **You are expected to arrange your post-semester travel plans accordingly. I will have little sympathy for students who state they are "unable" to take the final exam at its scheduled time, or that to do so would pose a hardship. If you voluntarily put yourself in this position, expect a zero for your final-exam score.**
  Note: As of 12/30/2023, One.uf page and the UF Schedule of Courses are listing our final-exam slot as Saturday, Apr. 29, 5:30-7:30 p.m., but **this is inconsistent with UF's rules for final-exam scheduling,** which are posted here. (The Registrar's Office made the same mistake last year.) The May 2 time-slot is the one determined by these exam-scheduling rules. *Honors* Elementary Differential Equations is not a large course, and has its own final exam, distinct

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from the *assembly* exam(s) taken by the large MAP 2302 sections. In the terminology on the above webpage, our final exam is a *time-of-class* exam rather than an *assembly* exam. The final-exam schedule at https://registrar.ufl.edu/courses/final-exam lists Apr. 27, 5:30–7:30 p.m. as the time slot *specifically* for **assembly** exams in three courses, one of which is MAP 2302. This schedule lists May 2, 3:00–5:00 p.m. as the time for all MWF 8th-period classes with time-of-class exams. The fact that One.uf and the Schedule of Courses already list the *room* for our exam as our usual classroom is also inconsistent with the assembly-exam categorization. (The final-exam-schedule webpage says "Assembly final exam rooms are assigned during the term;" i.e. these rooms are *not* known before the semester begins.) But I will check again with the Registrar's Office to make sure.

On any exam, unless I say otherwise, you are responsible for knowing any material I cover in class, any subject covered in homework, and all the material in the textbook sections we've covered.

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Homework

Homework will be assigned daily and is due by the next class, but will not be collected. **It is critical that you keep up with the homework daily. Far too much homework will be assigned for you to catch up after a several-day lapse, even if your past experience makes you think that you'll be able to do this.** I cannot stress this strongly enough. Students who do not keep up with the homework frequently receive D's or worse (or drop the class to avoid receiving such a grade).

The assignments will be posted on the [homework webpage](#). Assignments that are posted prior to class are estimates; they will often be modified within a few hours after class, according to how far we got that day. **You are responsible for checking this page frequently** (early enough for you to complete each assignment by its due-date), since in addition to updated assignments, other important information such as exam-dates will be confirmed on that page. Of course, changes of exam-dates will also be announced in class well in advance. However, **if you are unaware of a changed exam-date because you were absent when the change was announced and you didn't bother to check the homework page for several days, and this causes you to miss an exam or do poorly on it, that poor grade (0 if you miss the exam) will still be averaged into your final grade according to the percentages above.**

On most days I will not answer homework questions in class; you should see me in office hours for questions about homework (or the material we're covering). Time permitting, the class day before an exam may be used for Q&A, during which homework questions will be fine.

I advise against using solutions-manuals. To learn mathematics, you need to see a *small* number of problems worked out by someone else, just to see the principles illustrated; you need to *do* a *large* number of problems by yourself. The problems that I assign are selected to be doable based on what should be your accumulated store of knowledge and skills from your previous math classes, plus the material covered in class (or the textbook, or the assigned readings from my notes) up to that point. In the long run, you will learn more by struggling with a problem unsuccessfully for two hours, than by giving up after a few minutes and looking at someone else's solution. Also, the solutions in solutions-manuals are sometimes wrong or inefficient.

I do not use any online homework system. I have not seen any that I could trust not to count some right answers as wrong, or some wrong answers as right.

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Attendance policy

- As UF has advised, **students with a contagious illness (or reasonable suspicion of one) should not come to class.**

- *Healthy* students are expected to attend **every** lecture and discussion, barring such things as family emergencies, weddings, funerals, UF-sanctioned extracurricular activities, and religious holidays (see below). Potentially excusable absences that you know about in advance will not be treated as excused unless you inform me of them in advance.

  I expect students to arrive *on time* and to pay attention for all 50 minutes of the period. In most classrooms, arriving late is disruptive (as is leaving early). If a non-optional time commitment (e.g. a class the previous period in a distant location) will force you to be late on a regular basis, let me know at the start of the semester.

- **Religious Holidays.** The following is part of the [University of Florida Policy on Religious Holidays](). "Students, **upon prior notification of their instructors**, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith."

- **Students who *choose* (for reasons other than those of the types above) not to attend class regularly are *forfeiting the right to my help in office hours*, including explanations of their mistakes on homework and exams.** These students should also not expect replies to their emails, even for questions like "Is there an exam tomorrow?" or "Have you decided when the next exam will be?" Also be aware that the [University of Florida Attendance Policies]() contain the following paragraph:

  > The university recognizes the right of the individual professor to make attendance mandatory. After due warning, professors may prohibit further attendance and subsequently assign a failing grade for excessive absences.

  I am giving you now your due warning that I may prohibit further attendance and subsequently assign a failing grade for excessive absences. I reserve the right to impose a less extreme penalty instead.

- If you are absent from lecture or discussion, for any reason, you should obtain *written* notes from a classmate. (**Students are *not* permitted to share their own *recordings* of lectures with each other,** if they make any such recordings. See [In-class recording by students]() below.)

- If you miss class the day I return an exam or homework, you'll have to pick up your exam or homework from my office. I expect you to do this within a week (unless you are ill or quarantining); I will not hold onto your exam indefinitely. The same is true of any handouts that you missed receiving in class.

Classroom decorum:

- Reading the newspaper, reading messages on your phone, looking at your computer, talking, texting, etc., are rude and disruptive. **No electronic devices are to be used in class without explicit permission from me.** If you generally take notes by writing in a tablet, see me to get permission. I may ask at any time to see what notes you've taken.

- Please avoid disruptive or distracting noises, such as the tapping of pencils or feet, or the zipping or unzipping of backpacks several minutes before the end of class.

What if you miss an exam?

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If you miss an exam for a valid reason, and supply me with satisfactory documentation *promptly*, I will work out with you some way that is as fair as is feasible for you to make up the missing grade-component. Except in very large classes (which I don't teach) with cookie-cutter exams (which I don't give), there is no such thing as an equitable make-up exam. Thus, the way I have you make up the missing grade-component may or may not be via an exam. If you miss an exam for a reason that I do not consider valid (consistent with UF policy on which absences should be excused), or do not supply me with satisfactory documentation within two days, you should expect to receive a zero for that exam. If extenuating circumstances cause a reasonable delay in your providing me with satisfactory documentation, I may treat your exam-absence as valid and documented. (However, I will be the sole judge of what is "satisfactory", "extenuating", and "reasonable".)

If you are too ill to take an exam, please notify me by email before the exam starts (if possible).

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Student Honor Code

UF students are bound by The Honor Pledge, which states:

> We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

The Honor Code (which can be found here) specifies a number of behaviors that are in violation of this code, and the possible sanctions. Furthermore, students are obligated to report to appropriate personnel any condition that facilitates academic misconduct. If you have any questions or concerns about student conduct, please consult your instructor.

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My grading system for this course

1. After each homework or exam, I decide grade cutoffs for that item according to the philosophy "A = excellent, B = good, C = satisfactory, D = unsatisfactory but passing". In setting these cutoffs, *I do not have a predetermined grade curve or predetermined percentages for letter grades.*

2. At the end of the semester, I compute a numerical "raw score" for each student, on a 1000 point scale, using the weighting scheme stated earlier: 20% (200 points) for each midterm and 40% (400 points) for the final exam.

   On the exams themselves, you'll see point-totals different from the ones above. These are rescaled appropriately in the raw-score computation. For example, if point-values for the problems on the first midterm add up to 138, your exam score will be multiplied by 200/138 in the above computation.

The grades that UF currently allows instructors to assign are A, A–, B+, B, B–, C+, C, C–, D+, D, D–, and E. (**For grade-point equivalencies of these grades, see this catalog page.**) All of these are grades are possible in this class, except the D–.

In my philosophy (and that of my own college professors) of what a minus-grade means, a B–, for example, is *not* the lower end of the B range; it is *somewhat below* the bottom of the B range, and means that your work falls a little short of "good". (Said another way: another professor whose regards your work as "a little short of 'good' ", but who regards B– as meaning "the low end of the 'good' range", would *not* assign you a

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B– ; he/she would assign you a C+.) This philosophy is consistent with the degree-requirements for most majors at UF: courses count towards your major only if you get a "flat" C or higher, because a C– means that your performance was *less than* satisfactory—not that it was *barely* satisfactory—and therefore that you did not satisfactorily complete the course. This philosophy is also consistent with UF's S-U grade option.

For similar reasons, I have never given the D– grade. "D" means "unsatisfactory but passing". My D cutoff is the rock bottom of what I consider to be the "passing" range, so anything below that is a failing grade, which at UF is the E grade. (*Note*: Because a C is usually needed for a course to count towards requirements for majors, minors, etc., an unfortunate number of faculty, advisors, and students have come to refer to every grade less than C as "failing". *This is not the correct meaning of "failing grade", nor has it ever been;* again see this catalog page.)

Since I don't determine the exam-grade cutoffs ahead of time, I can't tell you in advance exactly how many points you'll need to get a particular grade for the course. The grade-scale page for the last time I taught the honors section of MAP 2302 (Spring 2018) may give you a rough idea of what to expect. You can find more examples of my past grade-scales by navigating from the "Past Classes" link on my home webpage. However, there is no guarantee that this semester's grade-cutoffs will be close to those of any particular past class of mine; they could be higher or lower. (There has been a great deal of variability in the strength of my students in the more than 35 times I have taught MAP 2302. Also, most of my past sections have been non-honors sections, and have been graded somewhat less rigorously than my honors sections.)

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Workload

On average, in order to receive an average grade, students should expect to spend eight to ten hours per week studying and doing homework for this class. This time-estimate is an *average,* not a maximum—some students will require more time, some less; some weeks the workload will be heavier, some lighter. Some circumstances that may increase your workload are:

- You did not study a similar amount in your previous calculus or precalculus classes.
- You have not retained the knowledge and skills that are the purpose of the prerequisites for this course.
- You cannot do algebra quickly and accurately without a calculator (this may be the case if you did not do a large number of exercises in your calculus or precalculus classes, or if you have relied heavily on calculators in the past).
- You want to get an A.

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Scheduling appointments with Dr. Groisser outside office-hours

• Before asking to make an appointment outside of my scheduled office hours, please *make sure you have first checked when all my office hours are.* Even though my office hours are *really easy* to find (in this syllabus and on my home webpage), more than half the conversations I have with students who think they can't make my scheduled office hours go something like this:

Student: "There's something I wanted to ask you about, but I have a class that meets MWF period X" [where period X is the time of, say, my Wednesday office hour that semester].

Me: "What about my Monday period Y or Friday period Z office hours?"

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Student: "Oh, I didn't realize you had a period Y or period Z office hour. Yes, Monday period Y [or Friday period Z] would work for me. I'll see you then!"

• Scheduling an appointment usually requires some back-and-forth questions about possible and/or convenient times. Usually, coming up to me at the end of class (rather than sending me an email) is the most efficient way to handle this. Email is inefficient for this. But in case you *do* try to handle this by email, here are some do's and don'ts for what to send me:

"I'd like to meet with you, but I have a conflict with each of the three days/times of each of your three regular office hours." [So far, so good. Student has indicated awareness that I have office hours at three different days and times, and has not (yet) asked any questions.]

- [**DON'T** WRITE THIS:] "Are you available any other times this week?"
  This is the wrong question to ask by email, even if directly followed by a second question like, "If so, what times could you meet?" The times that are most convenient for me might be times you have a conflict with. If I answer with only those times, we'll need at least one extra round of (avoidable!) back-and-forth emails. To give any answer that could avoid several rounds of back-and-forth email (other than "Speak to me after class"), I have to spend time a lot of time thinking about my answer. Also, I either have to spend time *writing* some sort of preference-order list, or wind up with you choosing a time that's really not convenient but that I put down in case your schedule conflicted with anything else.

- [**DO** WRITE SOMETHING LIKE THIS:] "Here is the full schedule of times I *can't* meet during the week" [followed by a listing of all classes, work conflicts, etc.], or "Here is a list of all the times I *could* possibly meet during the week" [followed by an appropriate list]." It's okay if, **in addition,** you state your preferences among the times that are possible for you. What's **not** okay is stating *only* your preferred times and asking me to choose from among them.

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In-class recording by students

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 does not include private conversations between students, or between a student and the instructor, that happen to take place during a class session. Recording of these conversations is prohibited.

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.** 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.

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Accommodations for students with disabilities. If you wish to request accommodation for a disability you must first register with the Disability Resource Center. It is always important that you share your accommodation letter with your instructor, and discuss your accommodations, as early as possible in the semester. **"Discuss" does not mean merely "notify"; it means *more* than just having the DRC email me your accommodation letter. Initiating a discussion of your accommodation, is the responsibility of the *student*.**

Teaching-evaluations. 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 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 or via ufl.bluera.com/ufl/. Summaries of course-evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/ .

UF Health and Wellness Resources:

- **U Matter, We Care initiative.** If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern, and a team member will reach out to the distressed student.

- **Contact information for the Counseling and Wellness Center.** Visit counseling.ufl.edu/ 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 shcc.ufl.edu/.

- **University Police Department.** Visit police.ufl.edu/ 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; ufhealth.org/emergency-room-trauma-center.

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Goals of course.

- For the student to know:

  - the meanings and definitions of basic terminology of (ordinary) differential equations (DEs), including: (ordinary) differential equation; initial condition(s); initial value problem (IVP); *solution* of a DE; solution of an initial-value problem; existence of and uniqueness of (maximal) solutions of an IVP; order of a DE.

  - mild conditions that guarantee the existence of a unique maximal solution of an IVP.

- For the student to be able to:

  - determine whether a given DE is
    1. linear and homogeneous;
    2. linear and non-homogeneous;
    3. separable;

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4. exact;
5. equivalent (on some region) to one of the above;
6. not equivalent (on any region) to any of the above.

- produce, for each of the DE-types 1–6 above, an example and a non-example of a DE of that type.

- find the set of all solutions of a first-order DE (or IVP) of any of the types 1–3 above, assuming that functions appearing in the DE satisfy certain mild conditions.

- solve (completely) any homogeneous second-order linear DE with constant coefficients, and any homogeneous second-order Cauchy-Euler DE.

- solve, completely, any higher-order constant-coefficient, homogeneous, linear DE, given a factorization of the characteristic polynomial.

- know when the Method of Undetermined Coefficients (MUC) is applicable, and to be able to apply it to find at least one solution of any linear constant-coefficient non-homogeneous DE of "MUC type".

- know when the method of Variation of Parameters ed is applicable, and to be able to apply it to find at least one solution of any linear constant-coefficient non-homogeneous DE not of "MUC type".

- know, and be able to establish, the relation between the general solution of a linear non-homogenoues DE and the general solution of the associated homogeneous DE.

- apply the preceding relation and write down the general solution of a of a linear non-homogenoues DE for which the student should be able to find a particular solution of the non-homogeneous DE as well as the general solution of the associated homogeneous DE.

- solve suitable linear initial-value problems via the method of Laplace Transforms.

- find series solutions (or truncated series solutions) of linear IVPs with polynomial coefficients and inhomogeneities, or with common analytic-function coefficients and inhomogeneities.

- recognize whether a given DE can be solved via methods studied in this course; when it is, to recognize which method(s) is/are usable; and when more than one method is usable, to recognize which method(s), if any, is likely to be easier to use than the other usable methods.

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Other items that are required for a General Education "syllabus"

- **Statement of General Education Objectives in mathematics** and other subject areas

- **Student Learning Outcomes (SLOs)** The list of SLOs is identical to the list of course goals, earlier in this document. These SLOs are assessed through the three midterms and the final exam. Knowledge of definitions and existence/uniquness conditions, as well as first-order methods, are assessed primarily in the first midterm and final exam. SLOs concerning second- and higher-order equations are assessed primarliy in the second and third midterms and the final exam. SLO concerning Laplace Transform is assessed primarily in the third midterm and final exam. SLO concerning series solutions is assessed in the final exam.

- **Criterion for Gen Ed credit.** A minimum grade of C is required for general education credit.