Changes may be made to this document, and to linked pages or files, before the semester starts.

Syllabus and course information

Honors Elementary Differential Equations
MAP 2302 Section 4219 (18286)
Spring 2026
MWF 8th period (3:00–3:50 p.m.), Little 235

Link to class home page

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 (including trigonometric substitutions); 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, 6, 7, and possibly some portions of Chapter 8 of the textbook, with some omissions, and with material presented differently (and in a different order) from the presentation 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;
- methods for solving constant-coefficient linear ODEs of order greater than 1, with an emphasis on the second-order case;
- One or both of the following, as time permits:
  - methods for solving some type(s) of linear ODEs with non-constant coefficients;
  - method of Laplace transforms.

Note: Starting with Fall 2024, UF shortened the fall and spring semesters by a week. MWF classes, which formerly had 43 class meetings in the spring, and usually somewhat fewer in the fall, now have 40 meetings in the spring and at most 40 in the fall (the number is reduced if UF has to close for any storms). This shortening is **significant**. It simply is not possible to cover the same amount of material in 40/43 (approximately 93%) of the time. Although I have removed some formerly covered topics from the syllabus, it is doubtful that there will be time for both of the above topics, or for order-greater-than-two constant-coefficient ODEs.

Textbook:

Nagel, Saff, and Snider, *Fundamentals of Differential Equations and Boundary Value Problems,* 7th edition,

OR

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

The second book consists of the first ten chapters of the first book. For these ten chapters, the two books are *identical*, page by page. Thus for this course, it does not matter which of the two books you use. (However, in case you think you might take UF's *second* course on differential equations, MAP4305, at some point: the longer textbook is used also in that class for material beyond what's in the shorter book.) 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

For anything that needs a response, **the primary way to communicate with me outside class is to see me in office hours**. The circumstances under which you may communicate with me by email are **limited**; see "Emailing me" below.

- **Office Hours:**

  Tentatively, Tuesday 7th period (1:55–2:45), Wednesday 5th period (11:45–12:35), 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.

  If you have COVID-19, the flu, or similarly 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** the hours listed above, 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 Scheduling appointments with Dr. Groisser outside office-hours, 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.

  See also the statement concerning office hours in the attendance policy.

- **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.** For student emails that deserve individual replies, in general I reply **only during my next office hour** or as soon thereafter as I can. 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.
  - **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 early in the body of the email rather than in 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 already answered in items you should already 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 you *elected* to miss for unapproved reasons, or that should be (or should have been) asked in office hours.
- 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.

- My email address is located here.

You are not expected to remember, at all times, each and every rule I'm putting into this syllabus (whether in the "Communications" category or any other). **What you *are* expected to remember is that those rules are posted *here*—and that you should check this page and the class home page *before* asking me a question that I may already have answered on these pages.**

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.

- **Assuming there is enough time for three midterms this semester,** 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.

- **If there is only enough time for two midterms,** then the *worse* of your two midterms (on a percentage basis) will count for 20% of your final grade, the *better* of your midterms will count for 35%, and the final exam will count for 45%.

(However, **your grade could be reduced by a penalty for unexcused absence(s).**)

I would *prefer* to have three midterms, but the shortened semester makes it difficult to fit in that many. To fit in a third midterm, I will either have to further reduce course-content, reduce classroom interactivity (my least-desired solution), or reduce or the number of class periods used for exams.

Committing to one of these solutions (or a combination), or to the number of midterms, before I know what pace I can maintain with this semester's students, would not be in your best interests. Every class is different.

After Drop/Add, I may poll the class to see whether out-of-class, evening midterms are possible, in order not to lose a lecture for each exam. To have any chance of that possibility working, I will need **full** cooperation from the class; having even a single student not respond promptly to a poll—without my having to send out multiple messages—could eliminate the possibility for the whole class.

Whether there are three midterms or two, *I reserve the right to adjust the above percentages* (20-20-20-40 or 20-35-45) 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.**

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.

Exam dates

- The final exam will be given Thursday April 30, starting at 12:30 p.m., in our usual classroom. **By registering for this section of this course, you are agreeing to be available for an in-person two-hour exam on this date at this time.** Otherwise, expect a zero for your final-exam score. Arrange your post-semester travel plans accordingly; I will not have sympathy for students who tell me they're "unable" to take the final exam in the time-slot announced above (modulo official disability-related extra-time accommodations), or that to do so would pose a hardship. If this exam-slot is a problem for you, you should take a non-honors section of MAP2302, in which case your final exam will be the prior Saturday at 7:30 **a.m.**.

- **Midterm exams:** Because of the uncertainty in how many there will be, I will not be able to estimate dates before seeing what pace we are keeping up. *Every MWF from Feb. 6 to Apr. 3 is a potential day for an in-class midterm,* but I will always give you at least a week's notice (minus a few hours) before an exam. **Expect a grade of 0 on an exam that you miss because you chose to be out of town on the date that an exam ends up being given. This includes the day before spring break (and the day after as well)!** (See "Attendance" below.)
  If you will be participating in excusable-absence activities (weddings, UF-sanctioned extracurricular activities, etc.) **that will cause you to miss class on any days that are not UF holidays, let me know the date(s) by Friday, Jan. 23,** so that I can attempt to avoid scheduling a midterm on such dates.

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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 are painting themselves into a corner, and 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 a given class meeting 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, exam-dates will also be announced in class well in advance. However, *if you are unaware of an exam-date (or change to it) because you were absent for the in-class announcement and you didn't 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 stated earlier.*

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 recommend **not** using solutions-manuals, certainly not on a regular basis. 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 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 misleading, inefficient, or outright wrong.**

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

- 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 excusable reasons such 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.

- **The day before a holiday is not a holiday. Neither is the day after.** These facts are not new, but have become even more important now that UF has shortened the fall and spring semesters by a week. Having a large number of absentees disadvantages not only the absentees, but their classmates; a half-empty class deadens the learning atmosphere. Every class day matters, and with the extra week off we're now been given in early January, nobody should feel any need for extra holidays not on the UF schedule. **A grade penalty of up to 5% may be imposed for an unexcused absence on the Friday before Spring Break or the Monday after.** If you are absent on those days for an *excusable* reason, I will expect documentation from you **promptly**. (Note that "My ride is leaving at x o'clock" and "My parents already bought my plane ticket before the semester started" are not reasons of excusable type. If that's a problem for you, there are many non-honors sections of MAP2302—including an online section—one or more of which may have an instructor willing to accommodate your holiday plans.)

- **Students who *choose*** (for reasons not of excusable type) **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**. (My own handwritten notes are not suitable for use by anyone but me.)

- 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, doing work for another course, 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.

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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.

   On the exams themselves, you'll see point-totals that (usually) are neither 100 nor the number of raw-score points that the a given exam accounts for. These point-totals, and your scores, are rescaled appropriately in the raw-score computation. For example, if the point-values for the problems on an exam add up to 138, and that exam counts for 20% of the final grade (200 points on a 1000-point scale), your score on that exam will be multiplied by 200/138 in raw-score computation.

3. By applying the same weighting scheme to the cutoffs for exams and homework, I construct raw-score grade cutoffs for each of the grades A, B, C, D. The cutoffs I use for A- and B+ are the trisection points of the interval from the B cutoff to the A cutoff; the cutoffs for the B-, C+, C-, and D+ grades are computed analogously.

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–.

> A minimum grade of B is required to earn Academic points towards Honors Completion Requirements. (*Note:* I will not, in any way, take this into account when assigning final grades. Being in the Honors Program does not entitle you to grades that further your progress towards meeting Honors Completion Requirements. *Earning* those grades is the *student's* responsibility. As quoted earlier from the Honors Program website, **Honors at the collegiate level is a *challenge*, not a *reward.***) Once you have earned your final grade in this course, please upload the course information and final grade from your Unofficial Transcript into your Honors Canvas Cohort: Honors Requirements module to earn Honors Milestone / Completion credit.

In my philosophy (and that of my own college professors) of what a minus-grade means, a B-minus, 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-minus; as meaning "the low end of the 'good' range", would *not* assign you a B-minus ; 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-minus 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-minus 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. My Honors MAP2302 grade-scale pages for Fall 2025, Spring 2025, Fall 2024, Spring 2024, and Spring 2023 may give you a rough idea of what to expect. (So should my final Fall 2025 grade-scale page, once it exists, but faculty are now required to post their spring course-materials several weeks before the grades for my Fall classes will be decided.) In addition to grade-scales, these pages include a "Distribution of final grades for course" grid at the bottom. You can find more examples of my past grade-scales (not all of which were for honors sections) 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. Also note that there's been a lot of variation in the distribution of course grades from semester to semester. (There has been a great deal of variability in the strength of my students in the nearly 40 times I have taught MAP 2302. Most of my past sections were non-honors sections—taught before those were converted to large-lecture format—and were graded somewhat less rigorously than my honors sections. But even among the honors sections, there has been great variability in the strength of the students.)

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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 my conversations 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 hour?"

  Student: "Oh, I didn't realize you had a period Y or period Z office hour. Yes, I *could* make your Monday period Y [or Friday period Z] hour."

- 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 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 days/times 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 *convenient* for me might not work for you. In that case, if I answer with only my preferred 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 for me but that I listed in case your schedule conflicts with all the other times I'm listing.

  - [**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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Honors Program contact information

- Honors Program, Honors Village Complex #4, 352-392-1519
- Quick questions for an Honors advisor? Email advisor@honors.ufl.edu
- Need an Honors advising appointment? Schedule via Microsoft Bookings: https://bit.ly/UFHonorsAdvising
- Honors Program Event Calendar: https://www.honors.ufl.edu/news--events/calendar-of-events/

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Miscellaneous policies and resources

This course complies with all UF academic policies. For information on those policies, and for resources for students, please see this link.

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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;
    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, possibly in implicit form, of a first-order DE (or IVP) of any of the types 1–4 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 method 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.
- 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, 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"

- **Link to 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/uniqueness 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.