Methods of Differential Equations
MATH 391, Section 1XC Summer 2020
T,W,Th 1:20pm – 3:00pm

Instructor: Jhevon Smith ("Jhevon" is fine.)
Email: JhevonTeaches@gmail.com (Do not email me at any other email address.)
Office Hour: By appointment only.
My Website: http://math.sci.ccny.cuny.edu/people?name=Jhevon_Smith
Class Website: https://math.sci.ccny.cuny.edu/pages?name=Math+391+1XC+Summer+2020
Text: Boyce and DiPrima, *Elementary Differential Equations and Boundary Value Problems, 10th Edition*.
Math Dept.: NAC 8/133   **Math Dept. website:** http://math.sci.ccny.cuny.edu
Math 391 Website: http://math.sci.ccny.cuny.edu/courses?name=Math_39100

Disclaimer: Consider this syllabus tentative. I do not expect to make any changes, but I may have to depending on how the semester goes. I reserve the right to make updates to the syllabus at any point during the semester. If this happens, I will inform you.

Texts: You are NOT required to purchase the text, but it would be very useful.

Calculators/Technology: While you may use these to do your homework or explore some topic in depth, you will not be allowed to use them on any quiz or exam.

Grading: Grades will be assigned according to the following chart.

Letter Grade	G.P.A.	Grade	Letter grade	G.P.A.	Grade
A+	4.00	97-100	B-	2.66	80-83
A	4.00	94-96	C+	2.33	77-79
A⁻	3.66	90-93	C	2.00	70-76
B⁺	3.33	87-89	**D**	**1.00**	**60-69**
B	3.00	84-86	**F**	**0**	**Below 60**

Under the current situation, departmental policy demands that the final exam be worth 50% of your grade in this course. The other 50% will come from your in-class grade. The grade breakdown for our class is as follows:

Quizzes: 10% (We'll have semi-regular quizzes, at most once a week)
Homework: 10% (Online via WeBWork)
In-class tests: 30% (We will have two non-cumulative in-class tests)
Final Exam: 50% (This will be a departmental, cumulative exam given at the end of the course.)

Make-up Policy: There are no make-ups for missed quizzes or HW. Make-ups for exams may only be given if you missed the exam for a very compelling (and documented) reason.

Warning: The best predictor of how well you will do in this class is your proficiency in Calculus II. If you're not sharp on your calculus 2 material, get sharp within the first week of classes. You won't do well otherwise. Some calc III topics will be needed, but they will be easier to catch on to as they appear.

Attendance: You will be assigned a WU (failing) grade if you accumulate 5 unexcused absences or if you stop attending class without officially withdrawing (please don't do this, if you're thinking about it, come talk to me—or at least talk to your academic advisor). This grade may also be assigned if you miss many important assignments/quizzes/tests and do not reach out to me regarding them.

To be excused for an absence you must email me no later than one day after that particular absence with the reason. Of course, proof is required where applicable. For example, if your absence or lateness was due to a doctor's appointment, I expect to see a doctor's note. If you miss a class, it is your responsibility to catch up.

My Expectations:

Work ethic: You are not to slack off! You are to read ahead! Very Important! Read each section before coming to class. It's better if you have your mind working on the concepts before coming to class—it will be easier for you to keep up, expand your understanding and ask intelligent questions. Later in this syllabus, the topics that we will cover are listed in the order we will cover them, so you can know where we're going and what you need to prepare for ahead of time. Start working hard from day 1, don't put yourself in a position where you'll have to catch up. Prevention is better than cure. I expect you to give 110% effort here. Even if you've taken this class before—no, *especially* if you've taken it before. 100% might do if you're great at calculus.

To do well in this course, you must study <u>daily.</u> Not just before class or before a test. Begin working on the HW for a section the day it is done in class. This is VERY important. Just showing up to class is not enough. You will need consistent and proper practice to do well.

Try problems yourself before asking for help or discussing with others. If you need help, see me, or go to tutoring. Do not stop working when you "feel" you've understood the material. It is important that you keep studying until you can solve problems as a matter of routine, and you can consistently get problems correct—in a timely manner, without the help of anyone or anything else.

Prerequisites: I also expect you to remember the math that you have done before this course, particularly calculus II. There is simply not enough time to go over the basics of calculus, as much as I'd love to be thorough. You just have to take it upon yourself to review calc 2 (and/or calc 1, 3, algebra, precalc,…) when necessary. I will assume you are all experts at the lower level math courses. If this is not currently true for you, make it true, quickly; like by the end of the week. You can find playlists for my precalculus, calculus 1, and calculus 2 lectures if you want to know what you're expected to know.

Responsibility: I do expect a certain level of responsibility, maturity, and integrity from you. You've made it this far, which means you know what it takes to get through a college math class. No excuses, and no begging for grades at the end of the semester. And no sob stories. Understand, that while I want to see every one do well and have no ill will towards anyone, it is *not* my responsibility to keep your GPA up, or to help you keep that scholarship, or whatever reason it is important that you do well here. These are your responsibilities. My responsibility is to facilitate you learning the material in this syllabus. I shall keep that responsibility. Please keep yours.

Homework: Online homework will be assigned through the WebWork system. Due dates for online homeworks will be listed in the online system.

To access the online homework system:
1. Go to https://webwork.ccny.cuny.edu/webwork2/20_Su391_1XC/
2. The username is your CCNY email address username, one word all lowercase.[1]
   For example, my CCNY email address is jsmith@ccny.cuny.edu[2], my username would be jsmith
3. The password is the same password you would use to access your CCNY email.[3]
4. You will be logged in to the page that has the list of assignments that are currently active.

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[1] See: https://www.youtube.com/watch?v=bLE7zsJk4AI
[2] Follow instructions and do NOT email me at my CCNY email address, but rather the Gmail address on the first page. I like to keep my student's emails separate.
[3] The password will remain precisely the same. If you change your CCNY email password, the WebWork password will automatically change to your new email password as well. The accounts are linked.

Blasphemies: At this level, certain mistakes will be considered unforgivable and will result in an instant zero in any problem where such mistakes are made. These are:

1. Canceling across sums
2. Distributing powers across sums
3. Dividing by zero
4. Making the mistake of thinking $\int 1/x^n\, dx = \ln|x^n| + C$ (this is NOT true unless $n = 1$!!!). It is also wrong to think that $\int \frac{1}{f(x)}\, dx = \ln|f(x)| + C$ when $f(x)$ is *not* a monic linear polynomial.
5. Making the mistake of thinking the derivative (or integral) of a product (or quotient) is just the product (or quotient) of the derivatives (or integrals). That sounded confusing, I'll explain this in class.
6*. While you won't be penalized outright for this, please use parentheses when appropriate. You'll end up penalizing yourself for not doing so.

Avoid these mistakes at all costs. I will punish you severely for making them—tough love. And yes, "+C" (or "+$\vec{C}$", as appropriate) is required when computing an indefinite integral.

Contact:

I will be emailing important information from time to time; including progress reports, announcements and advice as needed (to the email address listed for you on CUNYfirst. If this is not a good email address, notify me). Please read the emails. If I email you, it means it is important. You may get emails from my email address listed on the first page, or from JupiterGrades.

Help: Besides your online HW platform, there are MANY resources available to help you succeed in this class. Some of these are:

- First, there's me! Reach out to me if you have any issues with the course or if anything in your life is impeding your performance. Talk to me. I'm here to help you learn and succeed.

- I'll be uploading practice problems, as well as general advice on the class website. Be sure to check these out. The topics list towards the end of this document also has suggested problems for you to attempt from the text. These will not be collected, but it is highly recommended that you attempt them. You can see me or a tutor if you have issues. Which brings me to the next point.

- FREE Tutoring is available from the Science Division's Math/Physics Tutoring Center. You can find information about the tutoring center and its hours of operation here: http://math.sci.ccny.cuny.edu/pages?name=tutoring

- There are also online resources available. A great place to get math help, even at odd hours, is http://mathhelpforum.com/. There are other forums like Math Stack Exchange. Another great resource on the web is https://www.wolframalpha.com/. You can use that site to check your answers. Brilliant site. https://www.symbolab.com/ is another great site to check your answers, especially if you know what you'd like to compute and like using templates. I use http://graph.tk/ if I need to graph something quickly. Some kids like https://www.desmos.com/ for their graphing and computational needs. Of course, there are other online contenders like YouTube (where I'll also be posting videos of our lectures), Khan Academy, Paul's Online Math Notes, etc. Check them out. Google is your friend…and big brother. A quick Google search can do wonders.

- And don't forget your classmates. You should get the contact information of at least one person that you can study with or get missed notes from if you are absent, etc. You're all in this together, help each other out.

Student Disability Services: If you have a disability that may affect your academic performance, please contact the Student Disability Services (SDS), A.K.A. The AccessAbility Center (AAC), office within the first week of class. You may be entitled to extra time or other accommodations. Everyone should be given an equal opportunity to do well; be sure to see the SDS if you believe you may qualify for accommodations that will allow you to put your best foot forward. For more information, see: https://www.ccny.cuny.edu/accessability

Academic Integrity: Any act of academic dishonesty will be dealt with by applying the most stringent penalties permitted. Cheating includes, but is not limited to, receiving help during exams and submitting homework without properly acknowledging persons who assisted you. Please read carefully the Policy on Academic Integrity posted on the CUNY website with URL http://www1.cuny.edu/portal_ur/content/2004/policies/image/policy.pdf

I really don't like cheating; the university doesn't like it either. Please don't do it. There, I asked nicely. Don't make me act on this warning. I will; and it's not comfortable for anyone.

More advice: Believe in yourself (i.e. have/get a "growth mindset"); listen to Jhevon; work hard AND work smart. Be honest with yourself and seek help when you need it. The quizzes, homework and tests will let you know when you need help, NOT your personal feelings about how much you understand. Pay attention for more advice as the semester goes on. I have no incentive to fail you; I will give you advice that works. Ignore it at your peril.

Selected Events from the Summer 2020 Academic Calendar

For the full calendar: https://www.ccny.cuny.edu/registrar/summer-2020-academic-calendar-extended-session

Dates	Days	
June 01	**Monday**	**Classes begin – Yay!**
June 05	**Friday**	**Last day to: add a course; get 50% tuition refund; apply for Audit Options**
June 06	**Saturday**	**Course Withdrawal drop ("WD") period begins**
June 10	**Wednesday**	**Last day to: get 25% tuition refund; drop without the grade of "W"; Course Withdrawal drop period ends**
June 11	**Thursday**	**Course Withdrawal period begins (A grade of "W" is assigned to students who officially drop a class) - No Refund**
July 03	**Friday**	**Course Withdrawal period ends. Last day to withdraw from a class with the grade of "W"; Last day to file for Pass/NC option;**
July 20	**Monday**	**Last day of classes**
July 21 - 23	**Tuesday - Thursdays**	**Final Exams**

Topics and Assignments (based on 10th edition):

#	Section/Topic	Text Assignment for extra practice
1	1.1 Basic Mathematical models; Direction Fields	
2	1.2 Solutions to some differential equations	
3	1.3 Classification of differential equations	p. 24-25: 1, 2, 4, 5, 6, 16, 17
4	2.1 Linear equations; Method of integrating factors	p. 40: 7-10, 11- 15odd
5	2.2 Separable equations	p. 48: 3-17odd; p. 50-51: 31-37odd,
6	2.3 Modeling with linear equations	p. 60-63: 1-4,7-10,16
7	2.6 Exact Equations (may skip integrating factors)	p. 101: 1,3,4,7-13odd,17,18
8	2.9 Miscellaneous	p. 132-133: 1 – 14, 28, 29; p. 135-136: 36, 37, 41,42,43,45,48,49
9	3.1 Homogeneous equations with constant coefficients	p. 144: 1-11odd,16
10	3.2 Solutions to linear homogeneous equations; the Wronskian	p. 155-157: 1,3,5,14,16,38,39,
11	3.3 Complex Roots of the characteristic equation	p. 164: 1-11odd,17,19
12	3.4 Repeated Roots; Reduction of order	p. 172-174: 1-11odd,23,25,28
13	3.5 Nonhomogeneous equations; Method of undetermined coefficients	p. 184: 5-11odd,12,15,17, and 21-25 (Y(t) alone)
14	3.6 Variation of parameters	p. 190: 3,5,7,9,10,13,14
15	3.7 Mechanical and Electrical vibrations (Spring problems)	p. 203-204: 5,6,7,9
16	3.8 Forced Vibrations	p. 217: 5,6,9
*	**Exam #1; covers at most topics 1 through 16**	**June 25**
17	4.1 General theory of nth order linear equations	
18	4.2 Higher order homogeneous equations with constant coefficients	p. 234: 11-23odd
19	4.3 Method of undetermined coefficients for higher order linear equations	p. 239: 13-18 (Y(t) alone)
20	4.4 Variation of parameters for higher order linear equations (may skip)	
21	5.1 Review of power series	p. 253: 1, 2, 3, 5, 7, 8, 11, 14
22	5.2 Series solutions near ordinary points, part I	p. 263-264: 1,2,5-17odd
23	5.3 Series solutions near ordinary points, part II	p. 263-264: 8, 14; p. 269: 1,2,3
24	5.4 Euler equations; Regular singular points	p. 280: 3 – 15odd
25	5.5 Series solutions near regular singular points	p. 286: 1-9odd
26	6.1 Definition of the Laplace Transform	p. 315: 5, 6, 7, 8, 11-15, 21-23
27	6.2 Solutions to initial value problems using Laplace Transforms	p. 324-325: 13-17odd,21,22
28	10.1 Two-point boundary value problems	p. 595: 1, 3, 5, 6
29	10.2 Fourier Series	p. 605: 13-18
30	10.3 Fourier Convergence Theorem (may skip)	
31	10.4 Even and Odd functions	p. 620: 15-19
32	10.5 Heat conduction problems; separation of variables for PDEs	p. 630-631: 1-12
*	**Exam #2; covers everything since exam 1**	**July 16**
*	**Final Exam**	**July 23 @ 5:00pm - 7:15pm on Blackboard**

(The selected problems above are optional and will not be collected, however, if you're struggling in class or you anticipate struggling, consider going through ALL listed problems, and more.)

Anonymous Questionnaire

What is your major? _____

Are you sure you need this class? _____ Are you sure? _____

Will you need to do more math after this? _____

What is the highest math class you've taken? _____

Rate your interest: 5 = math is my life and I'm so excited to be here, down to 1 = I don't really like math, but I'm just here to get a minor or satisfy some requirement. _____

How good are you at Algebra? _____ Precalc? _____ Calc 1? _____ Calc 2? _____ Calc 3? _____
(Enter 5 for "I can do it in my sleep!", 4 for "I'm not the best at it, but pretty awesome.", 3 for "I'm just OK; I'm good at the basics.", 2 for "I'm not the worst, but far from the best.", 1 for "The class was a blur that got more obscure over time!", 0 for "I've never taken this class before.")

Do you work? Full-time or Part-time? _____

Are there any dates during the semester for which you will not be able to take an exam/quiz due to religious reasons? If so, please state the date(s) and "occasion(s)" below.

_____

_____

Any general feelings or concerns towards this course? (For example, are you: Scared? Excited? Curious? Indifferent? Based on your perceived ability in math, what grade are you expecting? etc)

_____

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_____

Are there any other relevant comments that you wish to add?

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_____

_____