

Course Guide Differential Equations 334: Fall 2026

Date	SAM		Topic	Lect. Note	PP (Practice Problems)
M: 8-24	1	5	The Integral Curve Problem, solutions and terminology	Chapter 1	43, 44
W:			Solutions to 1st ODEs: separation of variables and linear ODEs	2.1 & 2.2	1, 7, 13, 14, 17, 18, 21, 66, 67
F:	2	15	Solutions to first order ODEs: exact equations & Differential Forms	2.3	5, 6, 15, 22, 23, 28, 30, 32, 33, 34, 35, 36, 65, 68
M: 8-31	3	15	Solutions to first order ODEs: substitution	2.4	3, 4, 8, 11, 12, 13, 16, 25
W:			Physics and Applications	2.5	39, 45, 47, 48, 54, 55, 57, 58, 59, 61, 62, 69, 70, 71
F:			Existence, Uniqueness and Visualization	2.6	72
M: 9-7	4	10	Operators and Calculus	3.1	93, 94, 95, 96, 107, 122, 123, 156, 157, 164, 182
W:	5	10	n-th order linear ODEs, linear independence and the Wronskian	3.2	76, 86, 87, 88, 110, 113, 118, 119, 143, 145
F:			Sol. of the n-th order homogeneous ODE	3.3	73, 74, 75, 77, 78, 80, 81, 89, 90, 91, 92, 114, 115, 173
M: 9-14	6	20	Sol. of the n-th order non-homogeneous via annihilator method	3.4	83, 84, 85, 97, 98, 99, 101, 112, 116, 132, 134, 165, 174, 175
W:			Variation of parameters	3.5	82, 102, 137, 139, 140, 144, 146, 147, 179, 180
F:			Reduction of order and the 2 nd LI solution formula	3.6	125, 126, 130, 131, 141,
M: 9-21	7	20	Operator factorizations	3.7	127, 142,
W:	8	25	Cauchy Euler Problem	3.8	106, 111, 128, 129, 172,
F:			Motion of Springs with Friction and external force & RLC circuits	3.9	108, 109, 124, 148, 149, 150, 151, 152, 178,
M: 9-28	9	15	Questions		
W:			Boss Fight 1 [allowed a 3x5 inch card & non-graphing calculator]		
F:			Matrix Notation and Calculation & Row Reduction	4.1 & 4.2	202, 203, 204, 205, 239, 251
M: 10-5			Diagonalization and eigenvectors	4.3	196, 244, 245, 252,
W:			Existence and Uniqueness Theory for Systems of ODEs	4.4	190, 218, 219, 220,
F:			On the solution of Linear ODEs via real eigen solutions	4.5	186, 193, 194, 195, 201, 210, 224, 231, 253,
M: 10-12			On the solution of Linear ODEs via complex eigen solutions	4.5	188, 197, 212, 215, 226, 228, 229, 230, 247, 248
W:	10	15	On the solution of Linear ODEs via the matrix exponential	4.6	185, 187, 191, 192, 216, 217, 232, 233, 234, 235, 236, 237, 238, 240
Fall Break			No class 10-15, 10-16		
M: 10-19			On the solution via the matrix exponential & nonhomogeneous case	4.6 & 4.7	189, 211, 213, 214, 241, 242, 243, 246, 249, 250, 254, 255, 256, 257
W:	11	35	Energy Analysis and Qualitative analysis of systems of ODEs in plane	Chapter 5	198, 225, 227, 258, 259, 260
F:			Laplace Transform Technique: definition and basic rules	Chapter 6	261-271
M: 10-26			Laplace Transform Technique: inverse transforms	Chapter 6	272-282, 283-288, 309, 311,
W:			Laplace Transform Technique: discontinuous functions	Chapter 6	289-297, 308, 310, 313, 314,
F:			Laplace Transform Technique: Dirac delta function	Chapter 6	298-306, 312, 316,
M: 11-2			Laplace Transform Technique: additional examples	Chapter 6	317, 318, 319, 320
W:			Laplace Transform Technique: additional examples	Chapter 6	321-328
F:	12	30	Questions		
M: 11-9			Boss Fight 2 [allowed a 3x5 inch card & non-graphing calculator]		

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W:			Power Series Technique	Chapter 7	329-335, 345-349, 363, 370, 372-375, 376, 377, 378
F:			Power Series Technique	Chapter 7	338-342, 351, 352, 358, 359, 361, 364, 364, 367, 371
M: 11-16			Singular Points and the Frobenius Method	Chapter 7	336, 337, 343, 344, 350, 353, 354-357, 360,362,365,368,369,380
W:	13	25	Questions:		
F:			Final Boss Fight Part 1		(covers Chapters 1 – 7, allowed page of notes)
			Thanksgiving Break (November 23-27)		
M: 11-30			Introduction to Fourier Series	Chapter 8	(see my website for the problems solved from textbook etc)
W:			Heat Equation and its solution	Chapter 8	(see my website for the problems solved from textbook etc)
F:			Solution of the Wave Equation	Chapter 8	(see my website for the problems solved from textbook etc)
M: 12-7			Solution of Laplace's Equation	Chapter 8	(see my website for the problems solved from textbook etc)
W:			To be announced		
F:	14	25	To be announced		
M: 12-14			Final Boss Fight Part 2		(covers entire course, allowed page of notes)

Grading: usual 1000pts scale with:

Boss Fight 1 = Boss Fight 2 = Final Boss Fight = 260pts, SAMs = 220pts (Surprise Attack Missions)

Boss Fights & Studying: these are tests which are given in-class with significant time pressure. I expect students have worked many practice problems to get up to speed. Notice many practice problems and old materials are posted on the course website. In addition, I will assign SAMs as the Semester progresses. These can be given during class or they can be take-home bring back the next class. Generally late work for SAMs is not accepted. You should have a scientific calculator for the Boss Fights in this course. I may suggest practice problems in lectures, notice they are contained within the pdf of the Lecture Notes which is provided free of charge both in Canvas and the course website at www.supermath.info.

Classroom Expectations: I expect you to take notes on paper and to ask good questions and/or make corrections when I make mistakes. A wise use of time is to calculate parallel to my work to see if you can reproduce the same results. Certainly you don't have to copy everything down, but you ought to be writing at least summary notes on what we're doing. No laptops or phone use are permitted during lecture. I will stop and call you out if I notice it. I'd rather not of course. One exception to the phone rule, you can take pictures of the board work if you wish. I do try to record everything in the video of class and usually my camera does a good job of catching everything.

ODAS and SAMs: I do expect all the students to complete SAMs either in-class in the time allotted or take-home with a quick turn around time. There is no extra time for SAMs. If the SAM is given in-class and you have 50% extra time then you are allowed to skip one problem of every three. If you are given 100% extra time then you are allowed to skip one problem of every 2. Please write SKIP if you intend to use your accommodation on a given SAM in class. However, this does not apply to take-home SAMs, there is sufficient time outside class to complete the entire assignment. Thanks!

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Formatting: any work which is completed outside class should be done on standard size paper (like printer paper size, not legal or very small thanks) and just on one side of the paper. The only exception to this policy is when I at times print a single page on both sides where you should present your work and answers, in such a case the assignment will have instructions to show work and box answers in the space provided. When you are working on your own paper, your solution should include a complete statement of the problem as well as your solution. Answers should be clearly boxed. The best answer is a simplified answer where such algebra is appropriate. If multiple pages are used they should be stapled with a real metal staple neatly in the upper left corner.

Grade Replacement Policy: the Final Boss Fight may replace the grade for Boss Fight 1 or 2 if helpful. However, if you just skip a Boss Fight without some university approved excuse then the Final Boss Fight does not replace grades. I will drop the lowest 3 scores in the SAMs. Beware they may not all have the same weight, hypothetically they might be worth [50, 35, 35, 10, 10, 20, 20, 30, 50, 10] and suppose you earn [45, 15, 20, 3, 17, 12, 16, 22, 20, 10] then I'd drop your 3, 12, 10 and keep the rest $45+15+20+17+16+22+20 = 155$ (of 220 required pts). In my hypothetical scenario there were as many as 240pts to earn in SAMs if you had earned perfect scores on all the highest value assignments.

Advice: I do expect you come to class and try to follow along. It might be good to read the Lecture Notes before class to best understand class. Certainly you are allowed to ask questions in class about the material.

Please use email: My email is jcook4@liberty.edu. (please do not use Canvas Messaging, thanks!) Of course, you can also ask questions in-person during office hours. Please do not plan to work homework during my office hours, you can ask questions, but my office is not a place to calculate.

Phones, Watches and Glasses: well, it's strange to say, but the time has come that I will need you to visit my office hours for approval of your glasses if you intend to use them during the Boss Fights. I must do this out of an abundance of caution since there apparently exist glasses which allow cheating during tests. Likewise, in a similar vein, you must put away smart watches and smart phones during the Boss Fight. I may award the grade of zero for the assignment if this policy is violated. I have had some issues with students looking at phones in their laps, you must have your phone in a bag out of sight during in-class exams. Also, if you see someone cheating during the exam, please tell me during the exam not after so I can do something about it. When I hear about it after the fact I have had trouble discerning who was at fault and whether or not the accusation was indeed valid. If you see something, say something. Thanks!

Remark: The point values indicated above assume that the assignments are taken residually in the usual classroom or the Testing Center (if you have ODAS accommodations for such). In the case that these are taken in-person, in the usual fashion, it is possible to replace Boss Fight 1 or Boss Fight 2 with the Final Boss Fight grade if helpful. However, in the event the complete Final Boss Fight cannot be completed residually either by action of the student or policy of the university then the values of Boss Fights 1 and 2 increase and the Final Boss Fight is worth 10pts and the SAM values increase to make the value of the highest weighted residually collected SAMs to be worth 220pts. Unfortunately, no Boss Fights can be replaced in the event that the Final Boss Fight is not offered as a residually-proctored exam (for example, if the university was to go "virtual" after Thanksgiving Break then this policy would sadly be enacted). If on the other hand, the first part of the Final Boss Fight is given in a residually-proctored setting and for some reason Final Boss Fight Part 2 cannot be proctored (in the residential real sense of a human in the room with you making certain you don't use AI to finish the test) then the weight of Final Boss Fight Part 1 is doubled and it may be used for grade replacement of Boss Fights 1 and/or 2 as helpful (provided you didn't just skip the Boss Fights without a university approved excuse)