ORDINARY DIFFERENTIAL EQUATIONS

MATH 2280, CRN 2336, Fall 2024

http://faculty.weber.edu/aghoreishi/Math2280_F24/Math2280_F24.asp/

This course is a first of a two course sequence with the second course being Math 3280, Dynamical Systems.

Prerequisites: Math 1220.

Texts:

Required: Fundamentals of Differential Equations by Nagel, Saff and Snider, Addison-Wesley, 8th Edition, ISBN 978-0-321-74773-0**.**

Optional: Student's Solutions Manual, Viktor Maymeskul, ISBN 978-0-321-74834-8**.**
Mathematica Manual, Nagel, Polaski, Saff and Snider, ISBN 978-0-321-74838-6.
(This manual, in pdf format, is available in my website.)

References: Elementary Differential equations, Boyce and DiPrima, Wiley, any edition.
Calculus, James Stewart, Brooks/Cole, any edition.

A copy of these books, except the Mathematica Manual, are available in Mathematics Students' Room, TY 231.

Class Meetings: MWF 11:30-12:20, TY 448.

Instructor Information: Dr. Afshin Ghoreishi, http://faculty.weber.edu/aghoreishi/. Office: TY 450M. Office Hours: M 9:30-11:20 , T 8:30-9:20 and 9:30-10:20, W 10:30-11:20 and 12:30-1:20, and F 10:30-11:20. At other times, you can see me whenever I am in my office and not busy. You can also see me by making an appointment.

Procedures: I will try to answer a few questions at the beginning of each class, but this time will be limited. Our textbook is very well written. Thus, I highly encourage you to read it on your own. We will have weekly homework, two exams and a comprehensive final exam.

Do not enter the class late & do not come to class if you have to leave early. Turn off pagers, cell phones and other such disruptive devices. Do not text message. Failure to follow these basic courtesies may result in a failing grade. Typically, it is much harder to learn mathematics without attending class. The following policy is to help you earn your best possible grade. **Excessive absences** (5 or more) **may result in a grade of UW.** However, I expect you to behave in a responsible manner and I prefer not to take attendance.

Homework: A minimal problem list is included. To be successful in this class you should be able to solve all problems.

Each Friday I will hand out a homework sheet consisting of 10 or less problems with most of them from the problem list. **Homework will be due next Wednesday with the grace period until Friday at the start of the class. No late homework will be accepted.** However, on occasions, which I will announce, the homework will be actually due on Wednesday.

Do not solve two problems side-by-side, write only on one side of each page and staple your homework. Write your name on the top center position of the front page and number your pages as, for example; 1/7, 2/7, ... , 7/7 (if there are a total of 7 pages), on the top right hand corner of each page.

Some homework problems will require a Computer Algebra System. We will use Mathematica since you are Some homework problems will require a Computer Algebra System, CAS. We will use Mathematica. You can find the Mathematica manual for our textbook on my website. However, we will discuss Mathematica, as needed. As a WSU student, you have the benefit of getting your own free copy of this valuable and useful software by filling

out the form at https://www.weber.edu/software/mathematica_request.html. You may also wish to take the 1-credit hour course Math 1200, Mathematics Computer Laboratory.

You also have two additional homework. The first homework which is a review of some prerequisites, and a Mathematica lab which covers commands up to and including the level of this course.

Exams: Exams I and II will be administered at the Tracy Hall Testing Center and, tentatively, can be taken anytime during the time periods listed below. The final exam will be in class. **No make-up exam will be given.** Sample exams will be available at my website.

Exam I	Oct 15-16 (tentatively sections 1.1-4.7)
Exam II	Nov 19-20 (tentatively sections 4.9-7.8)
Final Exam	Monday, Dec 9, 11:30-1:20

The Tracy Hall Testing Center is located in the Tracy Hall, Rm. 101C, and will be open M-R 8:30 am - 8:00 pm, F 8:30 am - 4:30 pm, Sat 10:00 am - 4:30 pm. You must complete an exam by one hour after their closing time. You must also take along a picture I.D. **We will meet for our regular lectures during exam days.**

Extra Credit: You can earn extra credit by correctly solving and submitting your solution to problems posted in mathematics journals. You may also earn extra credit by making a presentation to the Math Factor. **These can be facilitated by attending the weekly meetings of Math Factor or taking the one credit hour course Math 2925, both meeting Mondays at 1:30 in TY 365.**

Grading: Exams will be curved as needed, but a minimum standard will be retained regardless of the class performance.

Exam I	100 points
Exam II	100
Homework	100
Final Exam	150
Extra Credit (optional)	*up to 20 points*

Total	450 points

Other Important Dates:

Labor Day Holiday	Sep	2
Last day to cancel a class	Sep	16
Fall Break	Oct	18
Last day to drop with a grade of W	Nov	5
Thanksgiving Holiday	Nov	28-29

If you decide to drop this class, please inform me of your decision.

Extra Help:

Study Sessions: Some sessions of Math Factor/Math 2925 will be devoted to group problem solving. You can also form your own study group which I can also attend, if possible.

Tutoring: You will find tutors in the **Solution Space**, **TY 233**. All other tutoring information can be found at the website http://weber.edu/Tutoring.

Mathematics Students' Room: TY 231 is a perfect place to study! You will find the books mentioned above in that room.

Course Coverage and Problem List for Math 2280			
Textbook: Fundamentals of Differential Equations by Nagel, Saff and Snider, 8th Edition			
Section	**Problems**	**Section**	**Problems**
1.1	2, 4, 5, 7, 8, 11, 13, 14, 16	7.1	
1.2	2, 3, 8, 10, 12, 16, 18, 20, 23, 25	7.2	1, 5, 8, 10, 12, 13, 16, 21, 24, 26, 31
1.3	2, 3, 5, 7, 8, 10, 11, 13, 16	7.3	1, 4, 7, 11, 15, 21, 24, 31, 33
2.1		7.4	1, 3, 5, 8, 11, 13, 20, 21, 25, 29, 31, 32
2.2	4, 5, 9, 11, 12, 15, 20, 23, 24, 27(a), 30	7.5	1, 2, 4, 7, 8, 10, 15, 21, 22, 25, 29
2.3	2, 3, 5, 8, 10, 11, 17, 20, 22, 23, 25(a), 27	7.6	1-3, 5*, 6, 8, 11, 15, 29, 30, 32, 34, 35, 37 *Use unit step functions
2.4	4, 6, 7, 10, 12, 15, 16, 21, 22, 25	7.7**	1, 2, 5, 6, 10, 11, 13, 14, 23, 24, 27, 28
2.5	1, 4, 5, 7, 8, 10, 11, 12, 15	7.8	1, 2, 5, 7, 8, 11, 13, 14, 17, 18, 22, 23, 25, 29, 30
Page 77	1, 3, 5, 7, 13, 19, 25, 29, 31,35, 41	Page 416	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25
3.1		8.1^R	1, 4, 5, 7, 8
3.2	1, 2, 4, 5, 7, 8, 9, 12, 21, 24, 25	8.2^R	1, 3, 4, 6, 8(a, e), 9, 12, 17, 18, 20, 21, 24, 27, 29, 30
3.4	In each problem, also write the IVP and solve it. 1, 2, 3, 5, 7, 8, 10, 12, 13	8.3	1, 4, 5, 8, 11, 12, 14-17, 19, 20-22, 24, 26, 27
4.1	2, 3, 5, 6, 8, 9	8.4	2, 3, 7, 9, 10, 13, 16, 18, 20, 21, 24, 27, 29
4.2	1, 4, 7, 10, 13, 16, 18, 19, 21, 25, 27, 29, 43	8.5	1, 3, 4, 6, 8, 13, 15, 16
4.3	2, 3, 6, 7, 10, 13, 16, 21, 22, 24, 25, 28	8.6**	1,5, 6, 10, 12, 13, 16, 21, 22, 25, 26, 27, 31, 32, 35, 36
4.4	1, 2, 4, 10, 12, 15, 16, 21, 23, 24, 26, 27, 30, 33	8.7**	3, 4, 7, 8, 9, 13, 14, 17, 18
4.5	2, 5, 8, 11, 13, 17, 20, 21, 25, 27, 28, 31, 32, 35, 37	Page 491	1, 3, 5, 6
4.6	1, 2, 3, 8, 10, 11, 12, 15, 16 Use $v_1' = - y_2\, g\, /\, W(y_1, y_2)$ and $v_2' = y_1\, g\, / W(y_1, y_2)$.	6.1	2, 3, 5, 8, 11, 14, 15, 18, 20, 21 23, 29
4.7	Do not use Theorem 8 or Cauchy-Euler equation. In place of Thm 8, follow the steps in its proof or Examples 4 and 5. 1, 2, 5, 8, 30, 32, 36-40, 45-48	6.2	1, 4, 6, 9, 11, 12, 15, 18, 20, 21
4.9	1, 2, 4, 5, 7, 8, 10	6.3	1, 2-4, 6-8, 31-33 (Method of Undetermined Coefficients)
4.10^{OL}	1, 3, 4, 6, 7, 9, 11, 12	6.4	1, 2, 5, 6-8
Page 233	1, 3, 5, 7, 9, 13, 15, 17, 19, 21, 23, 25, 29, 31, 33, 35, 39	Page 343	1(a), 2(c), 3, 4(a, c), 5(a), 6, 7(a), 8(a), 9
3.5^{OL}	In each problem, also write the IVP and solve it. 1-4	OL: See my website for the lecture. Not covered in exams. R: In class, we will only cover the parts we need. For a full review lectures of series, see my website.	
5.7^{OL}	1, 2, 4, 7, 8	**: If time permits.	