

# BOUNDARY VALUE PROBLEMS

## MATH 3710, CRN 21390, Fall 2023

[http://faculty.weber.edu/aghoreishi/Math3710\\_F23/Math3710\\_F23.asp/](http://faculty.weber.edu/aghoreishi/Math3710_F23/Math3710_F23.asp/)

**Prerequisites:** Math 2210 and Math 2280.

**Text: Required:** Boundary Value Problems by David L. Powers, Harcourt Academic Press, 6<sup>th</sup> Edition, 2010, ISBN 978-0-12-374719, (\$25 - \$90). (A copy of this book is available in the Mathematics Students' Room: TY 231.)

**Optional:** Student's Solutions Manual, ISBN 978-0-12-3756640, (Ebook).  
Who Is Fourier?: A Mathematical Adventure, Language Research Foundation, 1995, ISBN 0964350408.  
Applied Partial Differential Equations with Fourier Series and Boundary Value Problems by Richard Haberman, Prentice Hall. (A copy of the 4<sup>th</sup> edition book is available in the Mathematics Students' Room: TY 231.)  
Classical Thermodynamics by Schwinger, Milton, DeRaad, and Tsai, ISBN 0738200565. (Highly recommended by a previous student for study of Bessel functions.)

**Class Meetings:** MWF 8:30-9:20, TY 449.

**Instructor Information:** Dr. Afshin Ghoreishi, <http://faculty.weber.edu/aghoreishi/>. Office: TY 450M. Office Hours: M 9:30-10:20, T 9:30-10:20 and 11:30-12:20, W 9:30-10:20 and 12:30-1:20, and F 9:30-10:20. 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:** You are encouraged and expected to read the book on your own. I will try to answer a few questions at the beginning of each class, but this time will be limited. Utilize office hours.

We will have weekly homework, two exams and a 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.

Almost all students will do better by actively participating in class (attending class, taking notes, asking questions, etc.) and some can benefit from a little encouragement to do so. The following policy is to help you earn your best possible grade. **Excessive absences** (more than 5) **may result in a grade of UW.** However, if you don't like this policy, I will be happy to find you other accommodations.

**Homework:** A 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 and most of them will be from the problem list. Homework will be due the following Wednesday with the grace period until **Friday before start of the class. No late homework will be accepted.**

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.

## Boundary Value Problems

**Exams:** We will discuss the exact format of exams later. Here is one possible option. Exams will be administered at the Tracy Hall Testing Center. You may use electronic calculators in the exams. Exams can be taken anytime during the time periods listed below. No make-up exam will be given.

Exam I	Oct 17-18
Exam II	Nov 28-29
Final Exam	Dec 12-13

The 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.**

### Other Important Dates:

Labor Day Holiday	Sep	4
Last day to cancel a class	Sep	18
Fall Break	Oct	20
Last day to drop with a grade of W	Nov	7
Thanksgiving Holiday	Nov	23-24

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

**Mathematics Mondays:** The Mathematics Department offers you the unique opportunity to form a community of students and faculty, through weekly events on Mondays at 1:30 in TY 365. These events are free and open to all and include study sessions, puzzles and games, solving problems posed in mathematics journals, mathematics research, and talks by students, faculty and invited guests. Your level of participation is entirely up to you; from an interested observer, presenter of solutions to journal problems or interesting papers, to mathematics researcher. You can even earn credit through courses Math 2925/4925. Make Mathematics Mondays part of your weekly schedule for fun and enhancing the success of your post graduate plans.

**Extra Credit:** You can earn extra credit by correctly solving and submitting your solution to problems posted in mathematics journals. You can find these in the Fall 2023 folder in the shared P, J & R Directory, a Google Drive. You can also post your solutions there and work jointly together or with me. 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	100
<i>Extra Credit (optional)</i>	<i>up to 20 points</i>
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Total	400 points

**Extra Help: Mathematics Monday:** Attend the days that Mathematics Monday consists of group problem solving.

**Study Sessions:** In order to help you to have a strong start and a good outcome, I am willing to hold study sessions, but you have to organize it.

**Mathematics Students' Room:** TY 230 is a perfect place to study! You will find the books mentioned above in that room, and an ODE book for reference.

<b>Course Coverage and Problem List<sup>©</sup> for Math 3710</b>			
Textbook: Boundary Value Problems by David L. Powers, 6 <sup>th</sup> Edition			
This list may be adjusted, as needed.			
Section	Problems	Section	Problems
1.1	1, 2(a, d), 3-5, 7	3.5	1-6
1.2	1(a, b), 2-4, 5(c, e, f), 6, 7, 10(b, d), 11(b, d), 12, 13	Chap 3, Misc. Exer.	1, 5, 14, 15, 18-21, 26, 28
1.3	2-6	4.1	1-9
1.4	1(a, c, e, f), 2, 3(a, b), 4, 5	4.2	1, 4-6, 7(b), 8
1.5	1-9	4.3	1(b), 2-5
Chap 1, Misc. Exer.	13, 19, 40, 41, 42, 47, 49, 50, 51, 69	4.5	1, 2, 6, 7, 9
2.1	1-4	4.6	1, 3, 5, 6
2.2	1, 2, 5, 7, 8	Chap 4, Misc. Exer.	4, 6, 8, 11, 12, 15, 18, 19, 20, 23, 36
2.3	1-4, 7, 8	5.1	1-3
2.4	1, 2, 5, 8, 9	5.2	1, 4, 5
2.5	1, 2, 3, 6, 9, 10	5.3	1-6, 7(b), 8, 9
2.6	1, 3, 4, 6, 9, 10	5.4	1-7
2.7	1, 2, 3(a, d, e), 5(a), 6, 7	5.5	1, 3, 6, 9
2.9	1(a) (Assume $\lambda$ is real-valued), 3	5.6	1-4
Chap 2, Misc. Exer.	2, 5, 10, 17, 18, 20-22	5.7	1-5
3.1	1-3	5.9	2-7
3.2	3, 4, 6, 7, 11, 14, 15, 18	5.10	1-5
3.3	1-5, 10	Chap 5, Misc. Exer.	1, 2, 9, 15, 16
3.4	1-5		