BOUNDARY VALUE PROBLEMS
MATH 3710, CRN 21390, Fall 2022

Prerequisites: Math 2210 and Math 2280.

Text: Required: Applied Partial Differential Equations with Fourier Series and Boundary Value Problems by Richard Haberman, Prentice Hall, 4th Edition, 2004, ISBN 0-13-065243-1. (This is an old edition. You can find it as cheap as $10. Here are a couple of resources: Amazon.com and https://www.gettextbooks.com/isbn/9780130652430/ .) The same book will also be used for the Math 4710, Partial Differential Equations.

Reference: Boundary Value Problems by David L. Powers, Harcourt Academic Press, 6th Edition, 2010, ISBN 978-0-12-374719. (A copy of this book is available in the Mathematics Students' Room: TY 230.)
Solution Techniques for Elementary Partial Differential Equations, 3rd Edition, ISBN 978-1-4978-0495-3.
Who Is Fourier?: A Mathematical Adventure, Language Research Foundation, 1995, ISBN 0964350408. (A very interesting and informative book.)
Classical Thermodynamics by Schwinger, Milton, DeRaad, and Tsai, ISBN 0738200565. (Highly recommended by a previous student for study of Bessel functions.)

Class Meetings: MWF 12:30-1:20, 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 10:30-11:20, W 11:30-12:20, 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. **Excessive absences** (more than 5) **will result in a grade of UW.**

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 about 10 problems and many from the book problem list. Homework will be due the following Wednesday with the grace period until **Friday before at the start of the class**. The latest time I will accept homework is Friday at 12:30. The weeks that Friday is a holiday, we may change the due date to wednesday. **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.

Exams: Exams I & II will be administered at the 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 (tentatively sections 1.1-3.3)
Exam II	Nov 28-29
Final Exam	Hand Out: Dec 9, Due Date: **Dec 14, 8:30 a.m.**

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.**

Miscellaneous Information

Other Important Dates:

Labor Day Holiday	Sep	5
Last day to cancel a class	Sep	19
Fall Break	Oct	21
Last day to drop with a grade of W	Nov	8
Thanksgiving Holiday	Nov	24-25

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 2022 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.** The following are the talks of special interest for this class.

1. Proof of Convergence of Fourier Series - Write up and present the proof of convergence of Fourier series to the Math f(a)ctor. Reference: Course Textbook, BVP's and PDE's, David Powers, 6th edition, ISBN 978-0-12-374719-8.

2. Presentation of the calculus based proof of $\frac{1}{1} + \frac{1}{4} + \frac{1}{9} + \cdots = \frac{\pi^2}{6}$. You learned in Calculus II that this infinite series is convergent (p -series wi $p = 2 > 1$). In this class we will use Fourier series to find its value. But this can be done elegantly using calculus and is included in the book *Proofs from THE BOOK* by Martin Aigner and Gunte Ziegler, available in the library. Also, the paper http://math.cmu.edu/~bwsulliv/basel-problem.pdf lists several solutions with references.

3. Solve and submit your solution to any problem posted in certain mathematics journals. I will hand out these problems.

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
Extra Credit (optional)	*up to 20 points*

Total	400 points

Extra Help: **Mathematics Students' Room:** The code to TY 231, Mathematics Students's Room, is 654321. You will find the manuals mentioned above in that room.

Course Coverage and Problem List for Math 3710					
Section	**Problems**	**Section**	**Problems**	**Section**	**Problems**
1.1		3.5	1-7	5.8	1-10
1.2	1-9	4.1		7.1	
1.3	1, 2	4.2	1-3	7.2	1-3
1.4	1-7	4.3	1, 2	7.3	1-4
1.5	1-10	4.4	1-8	7.4	1-4
2.1		4.5		7.5*	1-9
2.2	1-5	5.1		7.6	1-4
2.3	1-5	5.2		7.7	1-10, 12
2.4	1-7	5.3	1-10	7.8	1-5
2.5	1-10	5.4	1-6	7.9	1-5
3.1		5.5*	1-10	7.10	1-7, 9, 10
3.2	1-4	5.6	1-3	8.1	
3.3	1-9	5.7	1, 2	8.2	1-8
3.4	1-11			*Time permitting	