

**CSE386M/EM386M FUNCTIONAL ANALYSIS IN THEORETICAL MECHANICS**  
**Fall 20, # 64385, # 13625/ MW 3:00 - 4:30**

Text: J. T. Oden, L. Demkowicz, *Applied Functional Analysis*, CRC Press, 2018 (third edition).

<b>Week</b>	<b>Topic</b>	<b>Chapter</b>
Aug. 26-Aug.28	1 Preliminaries: set theory, logic, relations	1.1-1.10
Aug. 31-Sep. 4	Functions, cardinality of sets	1.11-1.14
Sep. 9 -Sep. 11	Elementary topology in $\mathbb{R}^n$	1.17-1.20
Sep. 14 -Sep. 18	Vector spaces	2.1-2.4
Sep. 21 -Sep. 25	Linear transformations	2.5-2.9
Sep. 28 -Oct. 2	Algebraic duals, transpose of an operator	2.10-2.13
Oct. 5 -Oct. 9	Inner product, abstract measure	2.14, 3.1
Oct. 12 -Oct. 16	Lebesgue measure	3.2-3.3
Oct. 19 -Oct. 23	Lebesgue integral	3.4-3.5
Oct. 26 -Oct. 30	Fubini's Thm, $L^p$ -spaces	3.6-3.9
Nov. 2 -Nov. 6	General abstract topological spaces	4.1-4.2
Nov. 9 -Nov. 13	Compactness	4.3-4.5
Nov. 16-Nov. 20	Metric spaces, Bolzano-Weierstrass Thm	4.6-4.9
Nov. 23-Nov. 25	Banach Fixed Point Thm	4.10
Nov. 30-Dec. 4	Banach Closed Range Thm - an outlook	5.6,7,12,13,16,17

**Hybrid/Blended Meetings:**

Will will meet at the official class times, MW 3:00 p.m. - 4:30 noon in ASE 2.134 for a blackboard lecture. I will repeat the same lecture online on Tue and Thu, at 9:00am Central Time. Students may participate in person or online (synchronously and/or asynchronously) as health and safety dictate. You are strongly encouraged to participate synchronously if possible.

*In person.* The classroom is designed to accommodate all enrolled students with appropriate social distancing. We will meet on the class days throughout the semester and work online otherwise (for example, there will be no in person meetings starting November 30 after the Thanksgiving break). Meeting attendees must follow the Rules for Safe Class Participation (including wearing masks).

*Online synchronous.* Class lectures will be live streamed via Zoom (available in Canvas). While on Zoom, please mute your microphone unless you want to speak. If you have a question, you can switch your audio on and ask it, and then mute your audio again afterwards. (You can also use the chat feature of Zoom, but your Instructor might not see your comment in a timely manner.) If your bandwidth is limited, you can turn your video off.

*Online asynchronous.* Class lectures will be recorded (possibly using the Lectures Online recording system) and accessible later in Canvas (or possibly on UT-box) for a reasonable period of time.

Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

**Homework:** Homework assignments will be posted in Canvas after the lectures. The problems assigned in the class will be collected in the electronic form (.pdf files only) through Canvas.

**Exams:** There will be three (closed book) exams held remotely, during evening hours (5:00-8:00 p.m.) according to the following schedule:

- Exam1 (through Section 1.20) Mon., Sep.21,
- Exam2 (through Section 3.3) Mon., Oct.26,
- Exam3 (through Section 4.9) Mon., Nov. 23.

**Final Exam:** Comprehensive, mandatory, closed book and remote, given during the official scheduled time.

**Discussion session (obligatory):** remote, through zoom, Fri, 3:00-4:30.

**Instructor:** Dr. Leszek Demkowicz, POB 6.326, Office hours: *in person:* Mon, Wed, 4:30-5:30 (after the class), *via zoom:* Fri, after the discussion session.

**TA:** Jiaqi Li. Office hours TBD.

**Final Grade:** Is based upon the final score.

Final score range	grade
85 - 100	A with recommendation letter
75 - 85	A
72 - 74	A-
68 - 71	B+
65 - 67	B
62 - 64	B-
58 - 61	C+
55 - 57	C
52 - 54	C-
48 - 51	D+
45 - 47	D
42 - 44	D-
00 - 41	F

The final score is a weighted average of the test score, three mid-term exams and the final exam, with the following weights:

Homework	- 15 %
Exams	- 15,20,20 % each
Final	- 30 %