

MATH 830: Functional Analysis I
UNL, Fall 2019, Section: 001, CRN: 5031
Lecture: **M, W, F, 1:30-2:20, Avery Hall 111**

- Instructor:** Dr. Adam Larios **Email:** alarios@unl.edu
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Office Hours: T,R, 9:30 am – 10:50 am, or by appointment
Web: www.math.unl.edu/~alarios2/courses/2019_fall_M830/content.shtml
- Prerequisites:** MATH 315 (Elementary Analysis), or permission. You are also expected to be able to write mathematical proofs.
- Textbook:** David Borthwick. *Introduction to Partial Differential Equations (1st edition)*. Springer, 2016. ISBN: 978-3319489346
- Contacting me:** The best way to contact with me is by email, alarios@unl.edu. Please put [MATH 830] somewhere in the title and make sure to include your whole name in your email. Polite, courteous emails are appreciated; see my website for tips on email etiquette. My office is in Avery Hall, room 305. Drop-ins are welcome during office hours. If you want to meet me at a different time, please email me in advance, and we will try to schedule a time to meet.
- Description:** Mathematical theory of unconstrained and constrained optimization for nonlinear multivariate functions, particularly iterative methods, such as quasi-Newton methods, least squares optimization, and convex programming. Computer implementation of these methods.
- Motivation:** Functional analysis is a deep root that nourishes major branches of mathematics. It is at once simple and intricate, obvious and profound, delicate and unyielding. It has distinction as a subject in its own right, but it is also vital to the study of partial differential equations, quantum mechanics, C^* algebras, numerical analysis, optimization, probability, topology. It also makes strong appearances in algebraic geometry, number theory, coding theory, and many other areas. Learning to wield the power of functional analysis and to understand its subtiles is essential to the full development of a mathematician.
- Homework:** Homework is designed to help students understand the material, to prepare them for exams, and to give them experience writing programs based on the material. The given exercises represent a minimal assignment. Some students may have to work additional exercises or do additional reading to attain sufficient mastery of the material.
- I may also assign practice exercises that will not be collected. Homework problems must be written neatly in narrative English with mathematics embedded. \LaTeX is strongly encouraged, but not required.
- Reading & Exercises:** You are expected to read the appropriate sections of the text **before** coming to the class meeting in which the topic is scheduled. You are also expected to work through the indicated exercises after the corresponding material is presented in class, and **before** the next class meeting.
- Attendance & Preparation:** There is no textbook that exactly fits the course goals; hence, the lecture notes are the primary record of the course. Regular attendance and attention is therefore critical. It will be helpful for you to browse through the material before it is presented in class.

Daily attendance for class lectures is expected and is extremely important. While attendance is not recorded, missing even **one** class will put you behind. Note that there is a strong correlation between class absences and poor grades. You are responsible for all material and announcements in class regardless of whether or not you attended. **You are also responsible for making arrangements with another classmate to find out what you missed. You should not ask me to go over material you missed (due to tardiness or absences) during office hours or over email.**

If you know ahead of time that you will miss a deadline, exam date, etc. Please let me know as soon as possible in advance. Reasonable accommodations will be made for university-excused absences.

Collaboration: Collaboration is encouraged in this course. However, copying someone else's work and submitting it as your own is unacceptable. This act of academic dishonesty will be prosecuted in accordance with university policy.

Electronics: You are not allowed to have on your person during exams or quizzes any device that can access the internet or communicate in any way. Cell phones, Apple watches, etc. should be put away in backpacks/purses. Calculators, laptops, tablets, cell phones, and other non-medical electronic devices are not permitted during exams unless otherwise stated. During class, cell phones should be set on vibrate or off. If you need to take a call, send a text message, etc., please quietly leave the classroom to do so, so that you do not distract other students. You are welcome to return to class quietly when you are finished. If you wish to take notes using an electronic device, you must first demonstrate to me that you can type or write fast enough to do so properly, and that you can do it without distracting others, before the privilege to use such devices may be granted. If you are found to be abusing this privilege, you risk forfeiting it.

Make-up exams: Make-up exams will only be given with written evidence of an official university excused absence.

Incompletes: A grade of "incomplete" may be considered if all but a small portion of the class has been successfully completed, but the student in question is prevented from completing the course by a severe, unexpected, and documented event. Students who are simply behind in their work should consider dropping the course.

ADA Statement: Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the **Services for Students with Disabilities (SSD) office**, 132 Canfield Administration, 472-3787 voice or TTY.

Grade Questions: Any questions regarding grading/scoring of homework, exams, or projects must be made within two class days from when they were handed back, or no change in grade will be made.

NOTE: Because of privacy rights, I cannot discuss grades over email or telephone. Please do not email me asking about your grade. I will not be able to give you any information. Of course, I am happy to discuss grades in my office.

Important Dates:

Sept. 2:	Labor Day
Oct. 21-22:	Fall Semester Break
Nov. 27-29:	Thanksgiving Break

Departmental Grading Appeals Policy: Students who believe their academic evaluation has been prejudiced or capricious have recourse for appeals to (in order) the instructor, the departmental chair, the departmental appeals committee, and the college appeals committee.

Final Exam Policy: Students are expected to arrange their personal and work schedules to allow them to take the final exam at the scheduled time. The final exam for this course is:

Disclaimer: While this syllabus was prepared carefully and according to information available at the beginning of the semester, changes may be necessary in the interest of good teaching. Changes to any of the information above will be announced in class and posted on the class web site. This includes in particular possible updates or corrections to the syllabus, and changes of exam dates. Care has been taken to avoid any conflict between this syllabus and official university policy. Any such conflict, if it exists, is purely accidental, and appropriate measures will be taken to rectify any such mistake.

Tentative List Of Topics: The following tentative list of topics is a rough guide to the material covered in the course, but is subject to change. Updates and changes to the content will be announced in class, over email, on blackboard, or on the course website.