

MATH 3220-001: Foundations of Analysis II

Fall 2021

Instructor: Petar Bakic

Email: bakic@math.utah.edu (please use this address rather than the Canvas messaging system)

Office: LCB 207

Office Hours:

- Tue 4–5pm, LCB 207
- Thu 3–4pm, on Zoom (link will be posted on Canvas)

TECHNICAL DETAILS

Credit: MATH 3220 Foundations of Analysis II is a 4-credit course.

Prerequisites: C or better in MATH 3210 AND (MATH 2270 OR MATH 2250).

Course Type: In person

Class Meetings: MTWF 08:35–09:25, AEB 340.

Textbook: *Foundations of Analysis*, by Joseph L. Taylor. You can find the electronic version of the book in the AMS Bookstore ([link](#)).

Canvas: Canvas will be used for posting course announcements, homework assignments, grades, etc. Please check the Canvas page regularly!

ABOUT THE COURSE

Course outline:: This is a course on advanced multivariate calculus. It will be divided into four parts, each corresponding to a (roughly) four-week period:

1. Euclidean spaces
2. Differentiation
3. Riemann integrals
4. Vector calculus

Each of these parts will be accompanied by a comprehensive homework assignment and a written exam. These assignments will emphasize students' ability to understand and produce clear and rigorous mathematical arguments.

Expected Outcomes: By the end of the course, you will be expected to:

1. Understand the basic topology and convergence of sequences in Euclidean space. In particular, have a working knowledge of the definitions of open/closed/compact/connected sets. Understand limits of vector-valued sequences and their connection to the above properties;
2. Understand the concept of continuity in multiple variables;

3. Understand multivariate differentiation, in particular: finding and using the total differential, understanding its connection to partial derivatives, using the basic rules of differentiation, Taylor's theorem, and inverse/implicit function theorems;
4. Understand multivariate integration: determining bounds of integration, using Fubini's theorem and the change of variables theorem;
5. Understand and apply Stokes's theorem and its special cases.

Assessment and Grading:

- **Homework Projects (60%, 15% each)** Each of the four parts of the course will be accompanied by a comprehensive homework assignment. The assignments will often contain reading material to expand on the topics covered in class. Some parts of these assignments will be mandatory, some will be optional; most often, you will be able to choose the problems you turn in from a larger collection of practice problems.

The first three homework assignments will be due on Mondays of the exam weeks (before class!), that is: Sep 13, Oct 18, Nov 15. The final assignment will be due the last week of class (TBD). You will have to turn in your work in person (no electronic copies). No late work will be accepted.

Tips for turning in your homework:

- Notice that these assignments carry 60% of your grade. In particular, this means that you will be expected to put a certain amount of work into your homework. Do not put off your work to the last minute; instead, use the problems to supplement the lectures and try to evenly spread the workload.
 - Go to office hours! I will not give out or verify solutions, but will be happy to provide hints!
 - Discussions with your classmates are not only allowed; they are highly encouraged. Important: This does not mean sharing your assignment with others; it means working together! The work you turn in **must be your own** — even if you work on a problem with other people and come up with a solution as a group, you will have to put it into writing yourself. Assignments written up while looking at someone else's work are usually very conspicuous and will result in drastic point reductions.
 - An important goal of the homework assignments is to give students an opportunity to practice mathematical writing. Therefore, when grading your homework, I will also be looking at the way it is presented: Are the arguments coherent? Is the writing precise? In particular, your homework has to be readable!
- **Exams (40%, 10% each)** Three midterm exams (each worth 10%) will be given on select Wednesdays during class. Dates of midterm exams: Sep 15, Oct 20, Nov 17. These exams will consist of typical problems from the preceding three-week period; the idea is to assess your understanding of the most important concepts and techniques.
- The final exam (also 10%) will be similar to the midterms, although it may be cumulative (TBD). Our final exam is scheduled for Friday, Dec 17, 8:00–10:00am.

Important: Please contact me as soon as possible if you are unable to take any of the exams at the scheduled time.

Final grades are determined based on your total course percentage using the standard scheme:

		<i>A</i>	[93, 100]	<i>A</i> –	[90, 93)
<i>B</i> +	[87, 90)	<i>B</i>	[83, 87)	<i>B</i> –	[80, 83)
<i>C</i> +	[77, 80)	<i>C</i>	[73, 77)	<i>C</i> –	[70, 73)
<i>D</i> +	[67, 70)	<i>D</i>	[63, 67)	<i>D</i> –	[60, 63)
<i>E</i>	[0, 60)				

I may modify this grading scheme during the course of the semester; you will, of course, be notified of any adjustments.

CLASS SCHEDULE AND IMPORTANT DATES

Classes begin: Monday, August 23.

No school:

- Monday, September 6 (Labor Day).
- October 10–17 (Fall Break)
- November 25–28 (Thanksgiving break)

Exam Dates:

- Midterm 1: Wednesday, September 15 (homework due Mon, Sep 13)
- Midterm 2: Wednesday, October 20 (homework due Mon, Oct 18)
- Midterm 3: Wednesday, November 17 (homework due Mon, Nov 15)
- Final: Friday, December 17 (homework due TBD)

Drop/Withdraw Dates: The last day to drop is Friday, September 3. The last day to withdraw is Friday, October 22. Please check the academic calendar for more information pertaining to dropping and withdrawing from a course.

COVID-19

Vaccination: Get a COVID-19 vaccine if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks. Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine>, or <http://vaccines.gov/> to schedule your vaccination.

Masking: While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.

Testing: If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others. Saliva based testing is available at alert.utah.edu/covid/testing

Self-Reporting: All of us, including faculty, students, and staff, must self-report if we test positive for COVID-19 via this website: <https://coronavirus.utah.edu/>

POLICIES AND RESOURCES

Academic Code of Conduct: Students are encouraged to review the Student Code for the University of Utah: ([link](#)). In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty, including but not limited to refraining from cheating, plagiarizing, research misconduct, misrepresenting one's work, and/or inappropriately collaborating. A student who engages in academic misconduct as defined in Part I.B. may be subject to academic sanctions including but not limited to a grade reduction, failing grade, probation, suspension or dismissal from the program or the University, or revocation of the student's degree or certificate. Sanctions may also include community service, a written reprimand, and/or a written statement of misconduct that can be put into an appropriate record maintained for purposes of the profession or discipline for which the student is preparing.

Discrimination and Harassment: If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or Office of the Dean of Students, 270 Union Building, 801-581-7066. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS). Please see Student Bill of Rights, section E <http://regulations.utah.edu/academics/6-400.php>. You are always welcome to talk to me if someone is threatening or harassing you.

Student Names and Personal Pronouns: Canvas allows students to change the name that is displayed AND allows them to add their pronouns to their Canvas name. Class rosters are provided to the instructor with the student's legal name as well as "Preferred first name". I will refer to you with the name and pronoun that feels best for you in class or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support with related questions, I am happy to talk to you! The LGBT Resource Center might also be of help: ([link](#)).

English Language Learners: If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (<http://writingcenter.utah.edu/>); the Writing Program (<http://writing-program.utah.edu/>); the English Language Institute (<http://continue.utah.edu/eli/>). Please let me know if there is any additional support you would like to discuss for this class.

Undocumented Student Support: Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.

Veterans Center: If you are a student veteran, the U of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: <http://veteranscenter.utah.edu/>. Please also let me know if you need any additional support in this class for any reason.

Wellness Statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. Taking care of yourself is more important than academic success at all times. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776.

Student Success Advocates: The mission of Student Success Advocates is to support students in making the most of their University of Utah experience (ssa.utah.edu). They can assist with mentoring, resources, etc. Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact a Student Success Advocate for support (<https://asuu.utah.edu/displaced-students>).

The Financial Wellness Center provides competent and confidential financial counseling services for students. Some of the topics they cover include: scholarships, budgeting, paying for school, credit, taxes, student loans, and more! (<https://financialwellness.utah.edu>).

The Americans with Disabilities Act: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building,

801-581-5020. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted on the basis of your sex, including sexual orientation or gender identity/expression, you are encouraged to report it to the University's Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or to the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to police, contact the Department of Public Safety, 801-585-2677(COPS).

Campus Safety: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

University Counseling Center: The University Counseling Center (UCC) provides developmental, preventive, and therapeutic services and programs that promote the intellectual, emotional, cultural, and social development of University of Utah students. They advocate a philosophy of acceptance, compassion, and support for those they serve, as well as for each other. They aspire to respect cultural, individual and role differences as they continually work toward creating a safe and affirming climate for individuals of all ages, cultures, ethnicities, genders, gender identities, languages, mental and physical abilities, national origins, races, religions, sexual orientations, sizes and socioeconomic statuses.

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. Please consider reaching out to the Office of Dean of Students for any questions, issues and concerns. 200 South Central Campus Dr., Suite 270. Monday–Friday 8am–5pm.