

Math 618: Studies in Analysis
MW 6:00 – 7:50 pm in Jack Brown Hall 387

Instructor: Dr. Shawn McMurran
Phone: 909-537-7249 (or 77249 from campus)
Office: Jack Brown Hall 313
E-mail: smcmurra@csusb.edu
BlackBoard: <http://blackboard.csusb.edu>
Office Hours: MW 4 – 5, TR 2 – 3,
and by appointment (You are encouraged to make one if needed! ☺)

Text: *An User-Friendly Introduction to Lebesgue Measure and Integration*, by Gail S. Nelson

Prerequisites: Math 553 and at least one of the following: Math 554, 555, or 557

Welcome to Math 618!

Seeds of analysis can be found at least as far back as ancient Greece in geometrical ideas such as tangents to curves, measurements of solid bodies, and computing centers of gravity, as well as philosophical ideas about the infinite and the ensuing paradoxes. Jumping ahead to the 19th century, we find mathematicians exploring the connections between these geometrical and philosophical ideas. In mathematics, the 19th century is often referred to as the Age of Rigor. Using ideas that trace to Archimedes, we can estimate the measure of curvilinear figures as closely as we like by trapping them between polygons. Such ideas lend intuition to the idea of the integral developed by Riemann in the 19th century. Although the Riemann integral is now familiar to any first-year calculus student, Riemann's ideas were considered radical for his time. During this period, mathematicians were wrestling with an entirely new concept of function. As their understanding grew, mathematicians began to question whether the Riemann integral was as general as they initially believed. Could the concept be generalized further? If so, how? In this course, I invite you to join Cauchy, Weierstrass, Darboux, Jordan, Riemann, Dirichlet, Cantor, Lebesgue, and others, in a small part of their journey to understand the "problem of measure".



*Through space the
universe grasps me
and swallows me up
like a speck; through
thought I grasp it.*

- Blaise Pascal (1623-1662)

MA Student Learning Goals and Objectives

The CSUSB Math Department is committed to developing the best mathematical education it can provide with its resources and evaluating the outcomes of those efforts. For each program, we have developed a set of student learning goals and outcomes. Those for the MA program can be found here: http://www.math.csusb.edu/MA_SLO_2013.html .

In order for you to meet your potential in achieving these learning goals and corresponding objectives, this course will give you the opportunity to:

- Read and reproduce rigorous analytical arguments;
- Construct rigorous analytical arguments;
- Develop precision in thought and writing;
- Acquire facility in constructing appropriate counterexamples;
- Communicate mathematics professionally both verbally and in writing (using *LaTeX*);
- Explore fundamental ideas in analysis via the “problem of measure”.

COURSE EXPECTATIONS

As graduate students, you are responsible for ensuring your own success. In this course you will have the opportunity to achieve success by actively participating in and contributing to your own learning.

Most of our class meetings will include a mini-lecture or introduction to a concept followed by teamwork on problems and presentation of solutions. This approach will have the additional advantage of cultivating collaborative, written, and oral communication skills that are fundamental to most career fields including those in higher education and the private sector. Job requirements often include phrases such as: Strong interpersonal skills; ability to work in a team setting; strong written and oral communication skills. This class will help you become a stronger candidate for your future career by building such critical skills.

Learning mathematics requires more than the ability to apply algorithms or mimic proofs. True learning requires integrating new information with your own knowledge and experiences. Simply following a solution or proof that I present, or you find online, will not foster your ability to engage in the disciplinary ways of thinking about and “doing” mathematics as a professional does ... the kind of professional that you have chosen to become.

Classes will be designed based on the assumption that assigned reading will be completed before class. Warming up by doing the readings allows us to spend time going in depth into the concepts and ideas we are learning versus simply “covering” the reading material. Simply put, you will do mathematics the way mathematicians do!

Assignments and Warm-ups:

- Warm-up exercises will be due at the beginning of each class and will be scored on effort.
- Homework and reading posted regularly on BlackBoard.
- In general, the work to be turned in will include one exercise that must be typed with LaTeX.
- Exams will include problems similar to assigned and class problems.
- Problem solutions will be assessed on demonstration of insight, clarity and depth of comprehension, as well as format, neatness and grammar.

I strongly encourage you to work collaboratively, however, your individual style must be clear on the problems you turn in. Mathematical writing is a creative endeavor and, as a graduate student, it is imperative that you develop your own individual style and approach. Copied work (from any source) will not be tolerated and will not receive credit. If you do use or adapt the ideas of another person or source, be sure to give credit. Professionals always acknowledge their sources.

The following rules apply to homework that is turned in:

- Proofs must be rigorous and clearly written in appropriate mathematical format. Consult the documents on Good Mathematical Writing posted on BlackBoard.
- Name, due date, course and assignment number should be at the top of the first page.
- Multiple pages **must** be stapled.
- Overreliance on outside sources may result in a lower homework score.
- Late HW will not be accepted for any reason with the following exception: you are allowed a one-week grace period for one assignment. You get only one grace period – use it wisely! If you are absent on a day homework is due and do not wish to use your grace period, you may email it to me on the due date and turn in a hard copy before the next class meeting.

Portfolio Entry:

- Choose one proof or solution, subject to approval, for your MA portfolio entry.
- To earn portfolio credit in the course, you must complete your portfolio entry and obtain my signature before Friday, 12/9. I suggest tackling this assignment as soon as you find a problem that interests you and is of appropriate complexity. There are some projects at the back of the book that would make excellent portfolio entries.
- You may collaborate with one other member of the class on your portfolio entry, however, your write-ups must show your own style.
- Please note that I will not review portfolio entries more than 1 quarter after the course finishes. It would be best to have your entry fully approved by the end of the quarter.

Celebrations of Learning:

Exam 1 Mon, 10/17

Exam 2 Mon, 11/14

Final Exam Wed, 12/7

If you miss a quiz or exam you will receive a 0 for that test. Make-up exams WILL NOT be given without serious and compelling reasons for your absence.

Assessment

Participation – 15-20%
Warm-ups – 10%

Homework – 20-25%
Portfolio Entry – 5%

Exams – 40-50%

Grading Scale:

A (91 – 100%)	A- (88 – 90%)	B+ (85 – 87%)	B (80 – 84%)	B- (77 – 79%)
C+ (74 – 76%)	C (69 – 73%)	C- (66 – 68%)	D (55 – 65%)	F (54% or less)

IMPORTANT CAMPUS DATES:

- | | |
|-------------------------|--------------------------------------|
| • Wednesday, Oct. 12 | Census Date |
| • Friday, Nov. 11 | Veteran's Day – Campus Closed |
| • Thurs-Sun, Nov. 24-27 | Thanksgiving Holiday – Campus Closed |
| • Monday, Dec. 5 | Last day of classes |

POLICIES:

- In the event that class is unexpectedly canceled, you are still responsible for that day's material. It is your responsibility to check your campus email and the announcements on BlackBoard for notifications concerning the material, reading, or assignments for that day.
- **If you are in need of an accommodation for a disability in order to participate in this class, please contact Services to Students with Disabilities at UH-183 (537-5238).**
<http://ssd.csusb.edu/>
- **Drops and Withdrawals:** If you wish to drop the course it is your responsibility to formally withdraw from class prior to census. Drops after census are permitted only for serious and compelling reasons. For additional information, please refer to the CSUSB Bulletin under "Academic Regulations". <http://bulletin.csusb.edu/>
- **Plagiarism and Cheating:** The University has strict guidelines regarding the issues of plagiarism and cheating. For additional information regarding cheating and plagiarism, please refer to the CSUSB Bulletin under "Academic Regulations". <http://bulletin.csusb.edu/>

CLASSROOM PROTOCOL

- Please plan to be on time for class and to stay for the entire class period. It can be disruptive to the class when students frequently arrive tardy and/or leave early.
- Please turn the ringer on your cell phone to SILENT during class time – this includes "vibrate". This is especially imperative during tests and quizzes since both ringers and vibration noises can interfere with another student's concentration.
- Please be respectful to your instructor and your classmates. It is unprofessional and can be distracting to others when students text or engage in other off-task activities during class.