

Math 4390 Syllabus Senior Project

General and Particular Syllabus Summer 2022 Sul Ross State University

Course and Student Learning Objectives

The student will demonstrate adequate facility and success with the content of this independent study senior project course as supervised by a chosen Sul Ross math professor. The math professor will lay out the topics of study at the beginning of the semester.

This course is supportive of the Student Learning Outcomes for the Bachelor of Science degree in Mathematics:

- 1) The student will be able to demonstrate content knowledge of basic mathematical principles.
- 2) The student will be proficient in logic, able to negate statements, provide counterexamples to false statements, and determine the validity of arguments.
- 3) The student will be able to communicate mathematical content clearly and with valid reasoning.

Requirements

Besides the regular meetings and the 2 major requirements outlined below, the other requirements tailored for the particular course will be laid out by the professor at the beginning of the semester.

1. There should be regular student-professor meetings for a total of approximately 4 hours per week for 9.5 weeks with the meeting times scheduled by agreement of the professor and student. This includes attending seminars and conference events.

* By the end of the term, the student will be asked to complete **2 major required goals:**

2. A paper: double-spaced, 12 pt. font, margins no more than 1 inch, 10 pages or more in length. It is possible that a larger font might be used, but a larger number of pages would then be required so that the total length of the paper will be the same.

3. The student will make a 20-50 minute presentation in the departmental seminar of some of their semester results and findings. All tenure-track math faculty should be present for math senior project final presentations. A method for these other math faculty to give their input to the grade of the final presentation will be devised. In the case of a summer senior project, this seminar will be given during the fall departmental seminar time of Friday 2-3 pm.

Final Grade The primary professor will assign the **final grade** based on the above elements as he or she sees fit.

For example, the final grade might be assigned based on 30% for the paper, 20% for the seminar presentation, and 50% for other elements of the course such as class meeting attendance, homework notebook, quizzes, tests, etc.

Other Requirements

The student will keep a homework notebook that will serve as a journal for the student's studies during this senior project course. The final paper may be viewed as a cleaned up version based on excerpts of this student homework notebook. The student seminar lecture may serve as a presentation of excerpts of this homework notebook and paper.

The student will meet with the professor at a scheduled time such as Tue, Thu 2-4 pm (or some other agreed upon meeting schedule) so as to represent 4 hours per week of the 9.5 week full summer session June 1 to August 8. The following list of assignments will make up the tentative curriculum for the course.

List of Assignments:

1. Solve Sec. 10.4, No. 28 from the Stewart, 4th Ed. Calculus textbook.
2. Use Assgn. 1 to identify variables, such as gravitational constant, angle of projectile launch (such as soccer ball kick), wind force, angle of wind direction, projectile mass, initial speed of projectile, and any other variable of interest.
3. Use methods of Assgn. 1 and variables of Assgn. 2 to solve problem that is a generalized version used in the textbook exercise of Assgn. 1.
4. Use general formula derived in Assgn. 3 to apply to known elite soccer kicks.
5. Discuss and practice methods of presentation to be used in any presentation made by the student whether this is a seminar lecture or a poster board presentation. This will be practice for the final seminar presentation given by the student to math faculty for the final grade component, and any conference presentation during the term.
6. Investigate Galileo's contribution to gravity and relativity in both abstract derivations and lab experiment. This includes:
 - (a) Galileo's treatise on the center of gravity in solids. See Sec. 6.6 of Stewart, 4th Ed. Calculus textbook.
 - (b) Bodies of different weights fall at the same speed. That is, the speed of fall of a heavy object is not proportional to its weight.
 - (c) Uniform acceleration of falling bodies.
 - (d) The Law of Falling Bodies: The distance fallen by a body is proportional to the square of the elapsed time.
 - (e) The trajectory of a projectile is a parabola.
7. Use given resources to explain the difference between Isaac Newton's Universal Law of Gravitation and the law of gravity given in Albert Einstein's General Relativity Law.
8. Investigate Buffon's "needle problem" for approximating π as solved by Laplace using integral calculus. See Chapter 9 of David Burton's The History of Mathematics

Ed. 7.

SRSU Alpine Disability Services. Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Alpine students seeking accessibility/accommodations services must contact Mary Schwartze Grisham, M.Ed., LPC, SRSU's Accessibility Services Coordinator at 432-837-8203 (please leave a message and we'll get back to you as soon as we can during working hours), or email mschwartze@sulross.edu . Our office is located on the first floor of Ferguson Hall (Suite 112), and our mailing address is P.O. Box C-122, Sul Ross State University, Alpine. Texas, 79832.

Program Marketable Skills:

Marketable Skill (MS) 1: Students Demonstrate Logical and Analytical Skills.

MS 2: Students Demonstrate Problem-Solving Using Analytic and Algebraic Methods.

MS 3: Students Use Technology in Problem-Solving and Presentation.

MS 4: Students Use Communication and Pedagogical Skills.

Classroom Climate of Respect

Importantly, this class will foster free expression, critical investigation, and the open discussion of ideas. This means that all of us must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, we must all learn how to probe, oppose and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Still we will not be silenced by the difficulty of fruitfully discussing politically sensitive issues.

Diversity Statement

I aim to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, socioeconomic class, age, nationality, etc.). I also understand that the crisis of COVID, economic disparity, and health concerns, or even unexpected life events could impact the conditions necessary for you to succeed. My commitment is to be there for you and help you meet the learning objectives of this course. I do this to demonstrate my commitment to you and to the mission of Sul Ross State University to create an inclusive environment and care for the whole student as part of the Sul Ross Familia. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you.

Important Dates

Wed, June 1	First day of classes, first day of late registration and schedule changes
Fri, June 3	Last day for late registration and schedule changes
Thu, June 16	Last Day to Drop a Class with No Academic Record, 12th Class Day
Mon, July 4	Independence Day Holiday, No Classes
Thu, July 21	Last day to drop a class with a grade of "W" by 4 pm in University Registrar's Office
Mon, Aug. 8	Final Exams, End of Term