

Math 4900-01 (#24878)
Senior Capstone Seminar (3)
Spring 2015 (Monday, 12 January – Wednesday, 29 April 2015)
MWF 4:00-4:50 PM SNOW 124

Instructor: Dr. Brent D. Albrecht
Office: SNOW 137
Office Hours: TH 12:00 NOON – 1: 00 PM
 & By Appointment
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Prerequisites: Senior Standing and Mathematics Major.

Course Description: Required of all Mathematics majors in the senior year. Emphasizes both the ability to conduct research and the ability to communicate in the mathematical language by means of undertaking projects to include researching topics, summarizing journal articles, using a technical documentation system such as LaTeX, and making oral class presentations. Prepares students to complete the required standardized exit examination.

Objectives: To convey to the students the excitement and beauty of research mathematics, and to illustrate some of its applications in modern society.

To convey, to the extent possible using the content of this course, the quantitative literacy skill set adopted by Dixie State University:

All mathematics courses at Dixie State University support the general education goal of the university, and will:

1. Employ mathematical techniques in solving computational problems.
2. Interpret mathematical models.
3. Construct quantitative and logical arguments.
4. Apply mathematical knowledge to solve real-world problems.
5. Communicate in the mathematical language through the proper use of notation and terminology.
6. Explore and analyze mathematical concepts, using technology to the appropriate extent.

Upon successful completion of this course, the students will demonstrate through oral and written testing their skill as accomplished mathematicians. In particular, the students will demonstrate the ability to:

1. Identify research topics and problems of interest to them.

2. Read, interpret, analyze, and possibly expand upon ideas contained in modern mathematical research papers.
3. Write, in the mathematical language, research articles and papers that meet the current stylistic standards for publication within reputable scientific journals.
4. Utilize the TeX/LaTeX typesetting environment and the associated Beamer document class to produce technical and mathematical papers, together with accompanying slideshows, that meet the current formatting standards for circulation, dissemination, and presentation within the scientific community.
5. Give well-organized, precise, and compelling oral presentations of their findings.

“Philosophy is written in this grand book – the Universe – which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it.”

- Galileo Galilei

Text: Cracking the GRE Mathematics Subject Test, 4th Ed. by Steven A. Leduc.

Attendance: It is essential that students attend class, and roll is taken on randomly selected days in order to ensure student attendance. Tardiness is strongly discouraged. Attendance records may be used in determining borderline grades. Absences due to university-sponsored activities are handled as stated in Dixie State University Policy #5-23 (located at <http://www.dixie.edu/humanres/policy/sec5/523.html>).

Major Field Test: Students are required to take the Major Field Test. This is a comprehensive written examination covering a wide range of the topics typically included in the undergraduate curriculum. The Major Field Test is (tentatively) scheduled for Wednesday, 22 April 2015.

Research Paper: During the semester, each student is to identify, read, interpret, analyze, and possibly expand upon a modern mathematical research paper selected from *American Mathematical Monthly*, *Mathematics Magazine*, *The College Mathematics Journal*, or another reputable periodical. The finished product is a beautiful rendition of the author’s work, typeset in the original format and style, with student commentary to include additional relevant details and possibly even additional results. Each student must obtain the instructor’s approval for his/her choice of research paper.

Final Presentation: The final examination for this course is oral in nature. Each student is to prepare and give a well-organized, precise, and compelling oral presentation of the results of his/her individual research project. The

successful presentation is accompanied by a slideshow produced via the use of the Beamer document class in TeX/LaTeX.

Grading:	Major Field Test	30%	94 – 100%	A
	Research Paper	35%	90 – 93%	A-
	Presentation & Slideshow	35%	87 – 89%	B+
			83 – 86%	B
			80 – 82%	B-
			75 – 79%	C+
			70 – 74%	C
			65 – 69%	C-
			60 – 64%	D+
			55 – 59%	D
50 – 54%	D-			
0 – 49%	F			

Academic Integrity: Students are expected to uphold the highest standards of academic integrity. Section 4, Article XI of Dixie State University Policy #5-33 (located at <http://www.dixie.edu/humanres/policy/sec5/533.html>) outlines the standards of student academic conduct. While students are encouraged to collaborate on homework assignments, their submitted work should accurately reflect the results of their individual efforts. Students must do their own work during exams. Talking, having discussions, comparing papers, copying, and collaborating are not allowed on exams. The use of notes, unapproved calculators, and communication devices such as cell phones is also prohibited during exams. Academic dishonesty will result in the failure of written work and may lead to failure of the course and/or university disciplinary action.

Classroom Etiquette: Students are responsible for helping to maintain a respectful classroom learning environment. Academic discipline for instances of disruptive behavior are handled as stated in Dixie State University Policy #5-33 (located at <http://www.dixie.edu/humanres/policy/sec5/533.html>).

Accommodations: Any student seeking accommodations or services due to a disability must contact the Disability Resource Center (located in the North Plaza Building). Students may call the center at (435) 652-7516 or send an email to drc@dixie.edu. The Disability Resource Center determines eligibility for and authorizes the provision of accommodations and services. The center can arrange to provide materials (including this syllabus) in alternate formats if necessary.

Dmail: Important class and university information is sent to students' Dmail accounts. All Dixie State University students are automatically assigned a Dmail account. Students are responsible for knowing the information sent to their Dmail accounts.

Class Schedule: The Dixie State University Spring 2015 Semester Schedule is located online at <http://new.dixie.edu/reg/?page=spring2015>. The (tentative) schedule for the class is as follows:

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
January 12 Chapter 1	13	14 Chapter 1	15	16 Chapter 1
19 <i>M.L.K. Day No Class</i>	20	21 Chapter 1	22	23 Chapter 2
26 Chapter 2	27	28 Chapter 2	29	30 Chapter 2 <i>Proposal Due</i>
February 2 Chapter 3	3	4 Chapter 3	5	6 Chapter 3
9 Chapter 3	10	11 Chapters 3 & 4	12	13 Chapter 4
16 <i>Presidents' Day No Class</i>	17	18 Chapter 4	19	20 Chapter 4 <i>1st Draft Due</i>
23 Chapter 5	24	25 Chapter 5	26	27 Chapter 5
March 2 Chapter 5	3	4 Chapters 5 & 6	5	6 Chapter 6
9 <i>Semester Break No Class</i>	10 <i>Semester Break No Class</i>	11 <i>Semester Break No Class</i>	12 <i>Semester Break No Class</i>	13 <i>Semester Break No Class</i>
16 Chapter 6	17	18 Chapter 6	19	20 Chapter 6

23 Chapter 7	24	25 Chapter 7	26	27 Chapter 7 <i>2nd Draft Due</i>
30 Chapter 7	31	April 1 Chapter 7 & Review/Catch-Up	2	3 Review/ Catch-Up
6 Review/ Catch-Up	7	8 Review/ Catch-Up	9	10 Major Field Practice Test
13 Review/ Catch-Up	14	15 Review/ Catch-Up	16	17 Review/ Catch-Up
20 Review/ Catch-Up	21	22 Major Field Test	23	24 <i>Presentation Outline Due</i>
27 <i>Research Paper Due</i>	28	29 <i>Slideshow Due</i>	30 <i>Reading Day No Class</i>	May 1 Final Exam 2:30-4:30 PM