

Course Description

The Senior Seminar is the capstone experience for UAF's undergraduate mathematics program, and it will be conducted somewhat differently from your previous courses. I've picked a topic for the semester: Lie Theory. Your job will be to learn the material and teach it to each other. Most importantly, you will learn how to effectively communicate mathematics to your peers.

I'm here to help you with this process. I will provide a framework, guidance, and, alas, grades. But collectively you will be leading the class. You will get to practice figuring out unfamiliar mathematics on your own, as well as explaining it to others. You will be asked to give formal oral presentations, field questions from the audience, lead homework problem sessions, and actively participate in class discussions. This is going to be like no other math class you have taken, and I hope it will be rewarding and fun.

As for the material, Lie¹ Theory sits at the junction of analysis, geometry and linear and abstract algebra. It seems an ideal topic for pulling together all the mathematics you've learned in your undergraduate coursework!

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	damaxwell@alaska.edu
Phone	474-1196
Web	http://damaxwell.github.io
Required Texts:	Naive Lie Theory , <i>Stillwell</i> , Springer

Prerequisites

A grade of C or better in Math 401 or Math 308.

Class Time

Lecture Times
MW 9:15-10:15 Greuning 307

Office Hours

My office hours will be posted on my web site and outside my office door. You are welcome to schedule an appointment outside of my regular office hours; please send me an email and we will arrange a time.

Student Learning Outcomes

Students will:

- gain experience exploring an unfamiliar area of mathematics
- present ideas to others in a lecture environment
- solve problems in Lie theory

Class Time

There will be three hours of class lecture each week.

¹Rhymes with *flea* not *sky*.

Lecture Times

MWF 10:30–11:30 Chapman 104

Covid 19

We are still, still holding classes in unprecedented times.

- We need to be especially kind and patient with one another.
- Unforeseen circumstances are going to occur. I will try to ensure that the class is taught in a way so that if you must miss a class due to illness or other reasons, you will have tools to make up the missed class. Please see the section below on Zoom and recordings.
- If circumstances routinely impact your ability to participate in the course, please get in touch with me so we can determine a best plan of action.
- Course practices or this syllabus may need to be adjusted as the semester progresses. I will announce any changes as needed; syllabus updates will be posted on the web site.
- University policies related to COVID-19 are found at <https://sites.google.com/alaska.edu/coronavirus/uaf>. These can be expected to be updated.

Office Hours

I will schedule 3 hours a week of formal office hours after consultation with my students.

Discord

We will use a Discord server for class communication. An invite will be sent by email to sign up.

Mechanics

We will have two hour-long meetings each week. On Mondays we will start with a problem session. Part of this time will be used for addressing any questions that may have come up in completing the homework. After the problem session, we will have a 20-25 minute student-led lecture covering a section from the text, followed by a question and answer period. I will frequently give the Monday lecture.

Wednesdays will proceed similarly, but without the problem session. There will be one or two student presentations instead. You can expect to give a short presentation roughly once a week in the beginning of the semester. As the semester progresses, you will be asked to occasionally take on an entire Wednesday session, but you will present less frequently.

You will need to decide what material to present for your section; typically there will not be enough time to cover everything. Rather, you will need to think about what the important points are, and how best to explain them. You are welcome (i.e., highly encouraged) to talk to me while you are making these preparations. I will ensure that one of my office hours each week is devoted to this course alone.

Students who are not presenting will be expected to have read the material in advance and come prepared to ask questions and otherwise discuss the material. Class participation is part of your grade.

At the end of each meeting, I will assign homework problems that will be due as part of the next assignment.

I reserve the right to adjust the mechanics described here depending on the needs of the class.

Homework

Homework is due on Mondays. You will be expected to have finished the homework by the start of class, but you will hand it in at the end of the problem session. Unlike most classes I teach, I will generally not accept late homework. You must come to class ready to participate, especially in the problem sessions. However, I will make an exception to the “no late homework” policy under extenuating circumstances. Please speak to me if needed.

Midterms

There will be a midterm, tentatively scheduled for Wednesday, March 3. I reserve the right to make it a take-home midterm, but I expect it will be an in-class exam.

In addition, you will take the ETS Major Fields Test in Mathematics. This is a standardized test used by our department to monitor student outcomes. Your participation in taking the test will contribute to your class participation grade, but the test score you receive on it will not impact your course grade. We will hold it at a time and day to be announced later in the semester.

Final Exam

There will be a two-hour comprehensive written final exam on Friday, April 29 at 8am..

Evaluation

Course grades will be determined as follows:

Homework	20%
Presentations and Leadership	35%
Other Participation	10%
Midterm	10%
Final	25%

Letter grades will be assigned according to the following scale. This scale is a guarantee; I also reserve the right to lower the thresholds.

A+	97–100%	C+	77–79%	F	≤ 59
A	93–96%	C	70–76%		
A-	90–92%	C-	not given		
B+	87–89%	D+	67–69%		
B	83–86%	D	63–66%		
B-	80–82%	D-	60–62%		

Tentative Schedule

For most classes I would provide a tentative schedule in the syllabus. Given the student-led nature of the class, we will proceed a little less formally. The course text is divided into nine chapters, and each chapter contains about six bite-sized sections. Each student presentation will cover 1-2 of these sections. Given three presentations a week, at this pace we will cover

most of the text. I'll adjust the pacing as needed, though. We may not make it to the end of the text, but we'll cover a lot of ground regardless. The sections to be covered for each class will be posted at the course home page.

Rules and Policies

Collaboration

You are encouraged to work together in solving homework problems. But each student must write up his or her own solutions independently. If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

Makeup Exams

You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Attendance

Attendance is not included directly as part of your grade.

Cell Phones

Turn off your cell phone before you come to class.

Incomplete Grade

Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals

A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty

Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

Official UAF Syllabus Addendum

COVID-19 statement: Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website: <https://>

sites.google.com/alaska.edu/coronavirus/uaf?authuser=0

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

Student protections statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

Disability services statement: I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

Student Academic Support:

- Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)
- UAF Math Services, uafmathstatlab@gmail.com, Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List (https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf)

Student Resources:

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
- Student Health & Counseling [6 free counseling sessions] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Whitaker 203)
- Center for Student Rights and Responsibilities (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

Nondiscrimination statement: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status,

pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination. For more information, contact:

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