

Contents

MAT 4141: Capstone in Differential Geometry

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1.1 Catalog Description

MAT 4141 satisfies the general education capstone requirement for mathematics majors with concentrations other than education. Students will explore current, relevant, or advanced undergraduate topics in mathematics and the relationships of mathematics with other fields. Oral and written communication skills are emphasized. Graded on an S/U basis. Corequisite: Must be taken concurrently with Differential Geometry

1.2 Learning Goals, Activities and Grades

understanding responsibilities of community membership
communicating effectively
thinking critically and creatively
making local to global connections

Learning Goals

- a) research, analyze and reflect on discipline-specific materials. The idea is to incorporate different levels and areas as appropriate to investigate mathematical knowledge from MAT 4140 in order to recognize the development of mathematical ideas from the past and the breadth of mathematics covered in MAT 4140, its impact on mathematical study, and its relation to the global mathematical community
- b) write effectively in formats appropriate to an advanced level of the discipline
- c) document correctly in the conventions of the discipline
- d) reflect on your own development in the areas of thinking critically and creatively, communicating effectively, making local to global connections, and understanding responsibilities of community membership, which are the four general education goals at Appalachian

Critical and Creative Thinking & Local to Global Connections

We will engage in increasingly sophisticated research activities, which include historical and other connections to the global mathematical community. The readings, homework, reflections and research project will focus on critical thinking and creative products. You will focus on collecting and analyzing information, and recognizing scholarly versus other types of sources.

Communicating Effectively & Understanding the Responsibilities of Community Membership

My office hours are in 326 on Monday 12:30-1:45, and Tuesday/Thursday 12-1:45. You'll meet with me semi-regularly to discuss your progress. You will also pair with a peer. ASU's General Education Program prepares students to employ various modes of communication. Successful communicators interact effectively with people of

both similar and different experiences and values. You will peer review each other's work to help each other. We will also practice written work in homework assignments and the project. As per the University-wide Statement on Student Engagement with Courses you can expect to spend (on average) 2–3 hours outside of class for each hour in class. Homework during some weeks may take less than this time—your other time should be spent on the course project. Academic integrity is a fundamental part of the course, which includes meeting deadlines, participating in our capstone community, and giving proper reference where it is due. These are essential to course integrity.

Grades

The course is graded on an S/U basis so it makes sense that we'll be engaging in standards-based learning, where success is tied to meeting specific learning goals in assignments, rather than a percentage correct or point system. This will allow you (and I) to identify strengths and weaknesses early in the class and you'll have multiple chances to succeed. We'll employ Star Wars terminology as a metaphor—Padawans are training to one day become a Jedi. Jedi Knight is a rank within the Jedi Order, referring to Jedi who complete their training and pass the Jedi Trials to become full members.

An “S” grade means that all work has been completed at the Jedi Knight level or higher.**** You can think of a Jedi Master as a leader who has demonstrated exceptional achievement and earned a grade in the A range, if that helps you, but the course is graded on an S/U basis.

	missing	Padawan still training	Jedi Knight S	Jedi Master A
I can make a good faith effort in readings, homework, and reflections to satisfy learning goal a).				
I can turn in a quality research project in differential geometry to satisfy the capstone project rubric and learning goals a)–c).				
I can complete the course survey to satisfy learning goal d).				

***Accommodations in the determination of the final grade will be made for extenuating circumstances, such as those that are documented to prevent you from turning in work early or on time, including the level of achievements in the learning targets.

The Capstone Project is described at <http://cs.appstate.edu/~sjg/class/4141/capstoneproject.html> and the rubric for the project is at <http://cs.appstate.edu/~sjg/class/4141/capstoneprojectrubric.pdf>

1.3 Required Resources and Materials

- You will need regular online access to ASULearn and the library webpage. You can access these on and off campus (some require your ASU login).
- You will need printed copies of certain work.

1.4 Academic Affairs Policies

We adhere to the University-wide syllabus and policy statements:

<https://academicaffairs.appstate.edu/resources/syllabi-policy-and-statement-information>

1.5 Advice from Previous Students

- It is easy to forget about it. Block a regular time in your schedule for homework.
- Make sure the topic you choose for the course project is something you are interested in. If it isn't, you can change it at the end, but it is better to choose something good from the beginning.
- I had fun with the readings and activities. The reflections are as interesting as you make them.

- Remember that some weeks will have less homework than others. Spend any spare time on the course project so that your last weeks of class are not too crazy. The workload overall was fine.
- Dr. Sarah has set up the course project to be completed in steps to help you. Take advantage of these and her help. I hadn't realized that I could bring coding problems in to her office hours.
- Do not procrastinate and keep a regular checking period of the syllabus.

1.6 Tentative Schedule

Work is due on ASULearn by 11:55pm Friday unless otherwise noted, and detailed activities are described there and on <http://cs.appstate.edu/~sjg/class/4141/s18.html>. You will also meet with me periodically to discuss progress and challenges.

- Friday 1/19: Introduction to LaTeX and the course
- Friday 1/26: Introduction to the capstone project and careers in mathematics (Peer Activity)
- Friday 2/2: Scholarly peer-reviewed sources
- Friday 2/9: Part 1 of the capstone project
- Friday 2/16: *How to Write Mathematics* (Peer Activity)
- Friday 2/23: Preliminary bibliography
- Friday 3/2: *Guidelines for Good Mathematical Writing*
- Friday 3/16: Capstone survey
- Friday 3/23: LaTeX symbols and work on first draft
- Friday 3/30: First Draft is due to your partner (Peer Activity)
- Friday 4/6: Peer review of your partner's draft (Peer Activity)
- Friday 4/13: Read your peer's comments and use them to improve your draft (Peer Activity)
- Thursday 4/19 by 3:30: Second Draft due as a printed copy
- Friday 4/27: Writing in *How to Create Your Own Universe in Three Easy Steps*
- Final Exam Period: Capstone Project is due as a printed copy by Thursday May 10 at 2pm

1.7 Where to Get Help and Additional Policies

Check ASULearn often for homework. ASULearn is the easiest way to ask a question outside of class and office hours. You are also responsible for all assignments and announcements made on the web pages, so check them often. I prefer that you use office hours since it is easier to discuss material in person, but if you can not make them, then ASULearn is a great alternative. If the university cancels classes, check the web pages for updated info, as we may meet by videoconference and homework may still be due. Snapshots from your phone attached onto the private ASULearn forum are acceptable, for example. If there is some reason you must miss a deadline, then keep me informed, with any appropriate documentation, and turn the work in early or on time, if at all possible. I encourage you to talk to me often in class, office hours, and on the ASULearn forums and I am always happy to help. I also want you to be informed about your choices regarding what you tell me about certain types of sensitive information. In situations where students disclose experiencing an act of interpersonal violence to their instructor, faculty are required to report what students tell us to the campus Title IX Coordinator, who then reaches out to the student by email offering support services. I care about you and want you to get the resources you need. I'm happy to talk with you if you decide you want that, but please be aware that if instead you'd like to explore options with someone who can keep your information totally confidential, I highly recommend the Counseling Center at 828-262-3180. They offer walk-in hours as well as after-hours coverage: <http://counseling.appstate.edu>.

- Appalachian Cares is a place to find updates about matters of student health and safety. It also functions as the most up-to-date clearinghouse of information, resources and support available. <http://appcares.appstate.edu/>.
- The University Writing Center (UWC) offers free services to students, faculty, and staff of Appalachian State University and the Boone community: <http://writingcenter.appstate.edu/>
- The library offers Research Advisory Program (RAP) sessions. <http://library.appstate.edu/gethelp/rap>

- The Learning Assistance Program provides five core services. Two services, University Tutorial Services and Academic Strategy Instruction, are offered to all undergraduate students, and three services, ACCESS, Student Support Services, and Academic Services for Student Athletes, serve specific groups of students identified as needing comprehensive support. In Fall 2016, the ASU-R program joined the Learning Assistance Program. <http://lap.appstate.edu/welcome-learning-assistance-program-1>
- AppSync is your one-stop connection to engagement and leadership opportunities at Appalachian State. <https://appsync.appstate.edu/>

You should explore the course material and write out your thinking in a way that can be shared with others. Be sure to give acknowledgment where it is due. Submitting someone else's work as your own (PLAGIARISM) is a serious violation of the University's Academic Integrity Code, which defines: "Plagiarism includes, but is not limited to, borrowing, downloading, cutting and pasting, and paraphrasing without acknowledgement, including from online sources, or allowing an individual's academic work to be submitted as another's work."

1.8 Acknowledgements

Star Wars TM and © Lucasfilm Ltd., Twentieth Century Fox, Walt Disney and its companies. For educational use only. I adapted the idea from my friend Amy Ksir at the Naval Academy.