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MAT 5500: Independent Study by Matt Hefner

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1.1 Catalog Description

MAT 5500 - Independent Study (3). Prerequisite: 12 hours of graduate mathematics.

1.2 Course Description

In differential geometry, derivatives are applied to understand geometric objects such as curves, surfaces, and manifolds. Differential geometry relies heavily on connections between various disciplines of mathematics including calculus, real and complex analysis, linear algebra, and differential equations. As Tom Banchoff explains, “Thanks to striking developments in computer graphics, it is possible for us to have direct visual experience of objects... As we watch images moving on the screen of a graphics computer, we are faced with challenges like those of the first scientists to make use of telescopes or microscopes or X-rays. We are seeing things now that have never been before, and we are just learning how to interpret these images. It is literally true that we are in the first stages of a new era when it comes to visualizing dimensions” (*Beyond the Third Dimension: Geometry, Computer Graphics, and Higher Dimensions*). In this independent study, we will work to understand and communicate the visualization of geometric objects by coding such visualizations.

1.3 Activities, Learning Goals and Assessment

We’ll be engaging in standards-based learning, where success is tied to meeting the learning goals, 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 revise work in order 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. A C grade means that at least half the work has been completed at the Jedi Knight level or higher* and the rest a good-faith attempt. You can think of a Jedi Master as a leader who has demonstrated exceptional achievement by generally demonstrating all of the goals, and earned an A. To earn a B complete Jedi Knight (C) requirements plus half way to Jedi Master (A). A D is halfway to the C range.

| | missing | Padawan still training | Jedi Knight C | Jedi Master A |
|---|---------|---------------------------|------------------|------------------|
| I can research and review geometric objects and connections to differential geometry. | | | | |
| I can code visualizations of geometric objects. | | | | |
| I work independently and take the lead in discussions.** | | | | |
| I attend meetings regularly & positively participate.*** | | | | |

*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.

**I will ask questions in order to help you clarify what you are thinking and what kinds of issues you want to discuss.

***Active listening as well as respectful and meaningful participation and a willingness to complete activities are some examples of positive participation.

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 Office Hours

<http://cs.appstate.edu/~sjg/schedule/schedules20.html>

1.6 Where to Get Help and Additional Policies

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. 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 am 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/>.
- Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students, 324 Plemmons Student Union, for a list of resources and support. The ASU Food Pantry and Free Store is a free resource with pantry and personal care items, located in the Office of Sustainability on the bottom floor of East Hall.
- 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/>

Academic integrity is a fundamental part of the course, which includes meeting deadlines, regular communication, and giving proper reference where it is due. These are essential to course integrity. 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."