

**GSCI 104 – Severe Weather on Earth and in Space (1 credit)
Course Syllabus – Summer 2014 (June 16 – July 11, 2014)**

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Office Hours:

- In person, on campus, by appointment
- 24/7 SMS Text to 703-835-6336 or Google Hangouts!
- Or by appointment on Skype (videoconferencing) – most times of day/night

NATURE OF COURSE CONTENT

Scientific Perspectives, GSCI 104, is a course designed to partially satisfy the goals and objectives for Cluster 3 (Math and Science).

This is a one credit, four week, SELF PACED online class, part of your General Education Cluster Three course requirement. It will be conducted asynchronously, meaning you can log into class whenever you want! **However, this doesn't mean the class will be easy. You should plan on spending about 4 hours a week on this class over its four week span.** I will interact with you primarily through email and Google Hangout, but please feel free to call or text me as well. I am happy to talk to you about what you're learning, and explain things in more depth if and when you have questions.

There are 4 modules: EARTH, SPACE, DATA, and SOCIAL CONTEXT. Each module will include watching videos, completing online or oral exams, maybe doing a reading or two, *definitely* googling for supporting material, and taking notes. You can choose from several activities in each of the modules to create a course that matches your interests. When completing each module, it is your job to reflect on what is *meaningful to you* in that module, and how it can apply to your life and your intended role in society.

GOALS OF THE COURSE

Course Objectives

1. Students will be able to differentiate between "regular weather" and "severe weather" on Earth and in space.
2. Students will be familiar with the data and products provided by the National Weather Service (NWS) Storm Prediction Center (SPC) and Space Weather Prediction Center (SWPC).
3. Students will be familiar with how to interpret resources provided by the Storm Prediction Center (SPC), including how to read and decode Convective Outlook and Mesoscale Discussion forecast products.
4. Students should be able to discuss the basic characteristics of severe thunderstorms, and what conditions support the development of hail, high winds, and tornadoes.

5. Students should be able to discuss the basic characteristics of severe space weather, including the role of sunspots, solar flares, and coronal mass ejections (CMEs).

General Education, Cluster Three learning objectives pertinent to the course are:

Objective 1: Describe the methods of inquiry that lead to mathematical truth and scientific knowledge and be able to distinguish science from pseudoscience.

Objective 2: Use theories and models as unifying principles that help us understand natural phenomena and make predictions.

Objective 5: Use graphical, symbolic, and numerical methods to analyze, organize, and interpret natural phenomena.

Objective 6: Discriminate between association and causation, and identify the types of evidence used to establish causation.

Objective 7: Formulate hypotheses, identify relevant variables, design experiments to test hypotheses.

Objective 8: Evaluate the credibility, use, and misuse of scientific and mathematical information in scientific developments and public-policy issues.

COURSE STYLE & DELIVERY

This course implements the 10 Principles of the Burning Mind Project as its core value system. (<http://www.burningmindproject.org/the-ten-principles/>) The course is somewhat self-directed, blended (integrating online and in-class components).

- **Self-Directed:** You will prepare a work plan for the month and work towards successfully achieving many of the activities you attempt. You are not required to complete all activities you attempt. You can work individually or in teams, however, you must be prepared to answer fundamental questions about your learning.
- **Blended:** Some of the work can be done online, at your leisure, with minimal or no intervention by the professor (**for example, the COMET modules which can be accessed by registering at <https://www.meted.ucar.edu/>**). However, the professor is always available to answer questions about the content in ANY of the COMET modules.

REQUIREMENTS & POLICIES

Textbook: Videos and readings can be accessed online (see COURSE ACTIVITIES below).

Attendance Policy and Final Exam: NO LATE WORK WILL BE ACCEPTED. This course is only four weeks – consider it a quick sprint – buckle down and just do it! I don't offer incompletes.

Honor Code: You are expected to abide by the JMU Honor Code at all times.

Special Needs: If you are a student who is registered with the Office of Disabilities, I need to be given written documentation to support your situation in order to provide you with any accommodations (this is required by law). Plans for any accommodations MUST be made within the first 48 hours of this course since it is so short.

Contacting the Instructor: You can contact the instructor any time (24/7) via email or SMS to 703.835.6336. Do not be afraid. The instructor is usually very nice, and if she is asleep, her ringer is off.

METHODS OF EVALUATION

Grading

Grading is based on *accrued points* for completing various activities, exams, and projects, to the satisfaction of the instructor and/or instructor-designated proxies. You get as many chances as you like **within the four week session** to continually improve the quality of your work, but **points can only be accrued for successful completion of a particular activity or artifact.**

Your work plan MUST include the following:

- **AT LEAST ONE different activity** chosen from each topic group: EARTH, SPACE, DATA, & SOCIAL CONTEXT
- Work completed during **EACH WEEK** of the course (e.g. you can't do nothing and then cram all the work into the last week, and still expect to pass)
- **A written (~one page) reflection** delivered to the professor by email upon completion of your course activities describing *what you have learned* and *how you plan to integrate it* into your life or your career trajectory -- and **followed up by a short "exit interview" phone call.**

Grading Scale: 12+ accrued points is an A, 9-11 is a B, 6-9 is a C, 4-5 is a D, 0-3 is an F. 6 points must be completed in the first 50%/two weeks of the course, and your points are "vested" when you complete the reflection and exit interview call.

COURSE ACTIVITIES

Activity	How to Demonstrate Completion	Number of Points
EARTH		
COMET Climate Change and Extreme Weather https://www.meted.ucar.edu/training_module.php?id=973&tab=01	Online Quiz (Self-Paced)	1
COMET Flash Flood Case Studies https://www.meted.ucar.edu/training_module.php?id=267&tab=01	Online Quiz (Self-Paced)	1
COMET Skywarn Spotter Convective Basics https://www.meted.ucar.edu/training_module.php?id=816	Online Quiz (Self-Paced)	1
Understand FAQs at Storm Prediction Center (SPC) http://www.spc.noaa.gov/faq/ and Storm Morphology http://www.weatheranswer.com/public/Thunderstorm.pdf	Oral Exam (on phone or Google Hangout w/ Professor)	3
SPACE		
COMET Space Weather Basics https://www.meted.ucar.edu/training_module.php?id=901	Online Quiz (Self-Paced)	1
COMET Space Weather Impacts on Aviation https://www.meted.ucar.edu/training_module.php?id=963	Online Quiz (Self-Paced)	1
Explore Data Sources and Characteristics of Severe Geomagnetic Storms (sunspots, solar flares, CMEs, C-/M-/X-class flares) at Spaceweather http://spaceweather.com/	Oral Exam (on phone or Google Hangout w/ Professor)	2
COMET Physics of the Aurora https://www.meted.ucar.edu/training_module.php?id=161&tab=01	Online Quiz (Self-Paced)	3
DATA		
Understanding Convective Available Potential Energy (CAPE) http://en.wikipedia.org/wiki/Convective_available_potential_energy and stability indices http://www.theweatherprediction.com/severe/indices/	Oral Exam (on phone or Google Hangout w/ Professor)	1
Understanding Total Electron Content (TEC) http://www.swpc.noaa.gov/ustec/ and Planetary K-Index (Kp) http://en.wikipedia.org/wiki/K-index ; Data Sources and Characteristics of Severe Geomagnetic Storms (sunspots, solar flares, CMEs, C-/M-/X-class flares) at Spaceweather http://spaceweather.com/	Oral Exam (on phone or Google Hangout w/ Professor)	1
Skew-T Mastery (Severe Weather on Earth) https://www.meted.ucar.edu/training_module.php?id=225	Online Quiz (Self-Paced)	3

SOCIAL CONTEXT		
COMET Role of the Skywarn Spotter https://www.meted.ucar.edu/training_module.php?id=817	Online Quiz (Self-Paced)	1
COMET Anticipating Hazardous Weather and Community Risk https://www.meted.ucar.edu/training_module.php?id=890&tab=04	Online Quiz (Self-Paced)	1
Read Isaac's Storm and email me a 600-1000 word reflection discussing 1) social, 2) economic, 3) political, and 4) technological issues that you noticed in Isaac's Storm . How has our country's perception of severe weather and its implications changed over the past century? http://www.amazon.com/gp/product/0375708278/ref=as_li_ss_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=0375708278&linkCode=as2&tag=qualandinowe-20	Reflection & Discussion w/ Professor or small group on phone or Google Hangout	3