# Course Change Request

## New Course Proposal

Date Submitted: 01/29/26 4:20 pm

Viewing: **GGS 621 : Remote Sensing of Natural Hazards**

Last edit: 02/04/26 10:25 am

Changes proposed by: nburtch

**Programs referencing this course**

SC-CERG-RSIP: Remote Sensing and Image Processing Graduate Certificate

### In Workflow

1. **GGS Chair**
2. **SC Curriculum Committee**
3. SC Assistant Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

### Approval Path

1. 02/05/26 10:50 am Nathan Burtch (nburtch): Approved for GGS Chair

**Are you completing this form on someone else's behalf?**

No

**Effective Term:** Fall 2026

**Subject Code:** GGS - Geography & Geoinformation Science

**Course Number:** 621

**Bundled Courses:**

**Is this course replacing another course?** Yes

**Old Course Number:** GGS 777 - Remote Sensing Natural Hazards

**Equivalent Courses:**

**Catalog Title:** Remote Sensing of Natural Hazards

**Banner Title:** Remote Sensing Natural Hazards

**Will section titles vary by semester?** No

**Credits:** 3

**Schedule Type:** Lecture

**Hours of Lecture or Seminar per week:** 3

**Repeatable:** May only be taken once for credit (NR)
*GRADUATE ONLY*

**Default Grade Mode:** Graduate Regular

**Recommended Prerequisite(s):**
GGS 579

**Recommended Corequisite(s):**

**Required Prerequisite(s) / Corequisite(s) (Updates only):**

**Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):**

| And/Or | ( | Course/Test Code | Min Grade/Score | Academic Level | ) | Concurrency? |
|---|---|---|---|---|---|---|
| | | | | | | |

**Registration Restrictions (Updates only):**

**Registrar's Office Use Only - Registration Restrictions:**

**Field(s) of Study:**

**Class(es):**

**Level(s):**

**Degree(s):**

**School(s):**

**Catalog Description:**
Applications of remote sensing techniques for the observation, tracking, and analysis of natural hazards and disasters. Emphasis on satellite remote sensing platforms. Hazards include but are not limited to those related to tectonic activity, severe weather, cyclonic activity, and flooding.

**Justification:**
What: Creation of a new remote sensing course.

Why: Course is being offered as a special topics Spring 2026. Making this a permanent offering will expand our graduate remote sensing opportunities, providing more variety of classes. It is intended to replace GGS 777; this course at times has difficulty running due to it's inability to cross list with undergraduate seats. The new 421 / 621 can be cross level listed to improve the ability to run with sufficient enrollment.

**Does this course cover material which crosses into another department?** No

**Learning Outcomes:**

**Will this course be scheduled as a cross-level cross listed section?** Yes

**Please use the Additional Attachments button to attach two syllabi for review, one undergraduate and one graduate, preferably as separate documents. These should be provided in order to demonstrate the difference in expectations and assessments for undergraduates and graduates taking the course.**

**Attach Syllabus**

GGS621-Syllabus.pdf

GGS421-Syllabus.pdf

**Additional Attachments**

**Staffing:**

Dr. Donglian Sun is the creator of this course and primary instructor. We have several other remote sensing faculty that can also teach this.

**Relationship to Existing Programs:**

This course will be available for PhD ESGS students and also MS GECA and MS GEOI.

**Relationship to Existing Courses:**

Intended to replace GGS 777. Intended to cross level list with GGS 421

**Have you reached out to the Libraries to determine whether there are adequate resources to support your course? If not, please email Meg Meiman, Associate University Librarian for Learning, Research, and Engagement at mmeiman2@gmu.edu.**

No

**Additional Comments:**

**Reviewer Comments**

Key: 19232

**GGS 621**

**Remote Sensing of Natural Hazards**

**Spring 2026 semester (01/20-05/13)**

# SYLLABUS

Lecture: Every Wednesday 04:30 pm-07:10 pm (in-person)

Exploratory #2310


Instructor

Dr. Donglian (Lillian) Sun

Professor

Department of Geography and Geoinformation Sciences (GGS)

Contacts

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## Catalog description

Applications of remote sensing techniques for the observation, tracking, and analysis of natural hazards and disasters. Emphasis on satellite remote sensing platforms. Hazards include, but are not limited to those related to tectonic activity, severe weather, cyclonic activity, and flooding.

## Abstract


Every year, catastrophic natural hazards strike somewhere on Earth. These may cost thousands of lives, cause damage of billions of dollars, and destroy natural landmarks. Tsunamis, floods, landslides at worst even trigger an economic depression that might affect directly or indirectly the entire world, render a large territory uninhabitable, or destabilize the military and political balance in a region. Most of these events are caused by nature, but their potentially catastrophic consequences are tied to overcrowding and the emergence of megacities; the proliferation of

nuclear power plants and nuclear waste storage facilities; and the existence of high dams and other facilities whose destruction poses an unacceptable risk all over the globe. Thus, the study of natural hazards and of the processes that govern their occurrences has become a fundamental challenge for the survival of our civilization.

This course is designed to give students with an Earth science and remote sensing background a thorough introduction to gathering an overview of remote sensing and applications in natural hazards. The main emphasis of this course is satellite remote sensing applications in Hazard studies, such as flood/drought, tornadoes/hurricanes, earthquakes, and volcanic ash detections. The course may be modified according to students' interests.

The course will focus on the governing dynamics for different hazards, including but not limited to earthquakes, volcanic eruptions, severe weather and cyclones, increasingly harmful dust storms, floods, droughts, avalanches, and landfalls. The course will concentrate on observing, tracking, and even forecasting such events using satellite observations. These can be used to monitor the Earth's surface and atmosphere to give early warning information about impending hazards and information for risk management and disaster relief.

Each class will consist of either a lecture by the instructor and/or a guest speaker, or a class discussion. Each lecture will focus both on the governing dynamics of one or more hazards and the satellite data available for the study of each hazard. The class will be in a hybrid style, the third half will be Online Long-Distance education. Students are encouraged to suggest topics of their interest that can be studied more in-depth.

Students will be required to complete a term project and submit a final report related to the use of remote sensing data to study a natural hazard of their choice, as well as to give presentations, complete homework assignments, and actively participate in each lecture.

**Online Learning Community**

Working online requires dedication and organization. Students must check their GMU email messages on a daily basis and promptly communicate any questions or problems that might arise.

**Learning Outcomes**

At the end of the semester, students will be able to:

1. Understand, describe, and analyze major natural hazards through scientific presentations and reading academic literature
2. Develop critical thinking skills through discussions and short essays
3. Build skills by using remote data and visualization
4. Develop a project that demonstrates knowledge of a natural hazard and remote sensing applications in hazard studies

**Exercises**

Five exercises are scheduled this semester.

**Since the same class is for undergraduate and graduate students, the lecture notes and class materials will be the same. However, the homework and final exam/project will differ for undergraduate and graduate students.**

Each exercise will expose the students to questions, descriptions, and critical thinking.

**Discussions**

Five discussions are scheduled this semester.

**Project**

This is a project due during the last week.

The project will include a PowerPoint presentation, at least 10 slides, not including the title slide, and a term paper or poster due in the last week.

**Grading**

**The final grade is computed out of 100 points using the following letter mapping:**

**100-96 A+; 95-93 A; 92-90 A-;**

**89-87 B+; 86-83 B; 82-80 B-;**

**79-70 C; < 69 F**

**10% Attendance, Participation, and Preparation**

Attendance will be taken at the beginning of each class. Students more than 15 minutes late will be considered absent. Two absences are allowed with no penalty. One point will be taken for each additional absence up to a total of 12 absences. Students absent for more than 12 lectures will receive an F. Oral questions about the course material and the reading assignments will be asked, and students are expected to actively participate in the discussion.

**30% Homework**

Students are encouraged to use any sources they believe are appropriate for their research. Students will be asked to provide an oral summary of their findings in class.

**25% Midterm**

The midterm covers material from both lectures and assignments. This is a closed-book, in-class, individual exam.

**35% Final Exam/Final Project**

If students choose a final exam, the final exam covers material from both lectures and assignments. This is a closed-book, in-class, individual exam.

**Policies**

**Policy on Absence**

Students are expected to actively participate in the lecture, lab and class discussion. When a student misses a lecture, he/she is invited to let the instructor know in advance. The student is still responsible for the material and assignments covered in the lecture.

Refer to the attendance section of the Syllabus for grading information.

**Policy on Exams**

The midterm and the final exams are mandatory. There is no makeup exam, unless for extreme circumstances. If a student does not take the midterm exam, he/she will receive a 0 score. If a student does not take the final exam, he/she will receive an F grade.

**Policy on Late Work**

Homework will be due after two weeks of the assignment. 2 points will be taken for each 24 hours starting from 14:00 of the due date.

**Policy on Reading Assignments**

Students are required to read the book chapter relative to each lecture BEFORE coming to class. Questions about the text will be asked during the lecture, and students are expected to be able to answer them.

**University Policies**

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.

**Common Policies Addendum**

Please visit https://stearnscenter.gmu.edu/home/gmu-common-course-policies/ for the Common Policies Addendum. This addendum covers University policies about academic standards, accommodations for students with disabilities, FERPA, and Title IX.

**Class Cancellation**

If a class is cancelled due to inclement weather or other reasons, the syllabus will be updated as early as possible. Best efforts will be made to send each student an email with information on the cancellation of class. Make-up classes will be scheduled during the next lecture. When an exam is cancelled, it will be given during the next lecture.

**Schedule**

| Date | Topic |
|---|---|
| Week1 | Introduction to Natural Hazards and Disasters<br><br>Class discussion: Which hazards are most dangerous? Which parts of the world are most at risk from natural hazards, and which parts are safer? |
| Week 2 | Remote sensing applications in Earthquake studies |
| Week 3 | Remote Sensing of Volcanoes and Volcanic Ash |
| Week 4 | Remote Sensing of Landslides |
| Week 5 | Remote Sensing Applications in Tsunami Studies<br><br>Class discussion: What causes tsunamis and their destructive power |
| Week 6 | Remote sensing of Severe weather, Thunderstorms, and Tornadoes<br><br>Class discussion: What are Tornadoes, and why do they exist? Are tornadoes increasing in strength and frequency? |
| Week 7 | Remote sensing applications in Tropical Cyclone/Hurricane studies |
| Week 8 | Spring Break |
| Week 9 | Mid-term exam |
| Week 10 | Remote sensing applications in storm surge/coastal erosion |

| | |
|---|---|
| **Week 11** | **Remote Sensing Studies in Climate Change** |
| **Week 12** | **Flood detection from satellite observations**<br><br>**Class discussion: How can remote sensing help in studying and monitoring floods?** |
| **Week 13** | **Drought detection from satellite observations**<br><br>**Class discussion: How can remote sensing help in studying and preventing droughts?** |
| **Week 14** | **Wildfire detection from satellite observations (Online)**<br><br>**Class discussion: The importance of forests and the consequences of their destruction** |
| **Week 15** | **Reading day** |
| **Week 16** | **Project presentation/Project paper due** |