Course Change Request

New Course Proposal

Date Submitted: 08/30/20 10:37 pm

Viewing: GGS 429 : Remote Sensing of the Environment and Earth System

Last edit: 08/30/20 10:37 pm

Changes proposed by: nburtch

In Workflow

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

Approval Path

1. 09/10/20 2:00 pm Nathan Burtch (nburtch): Approved for GGS Chair

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

No

Effective Term: Spring 2021

Subject Code: GGS - Geography & Geoinformation Science

Course Number: 429

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Remote Sensing of the Environment and Earth System

Banner Title: Remote Sensing Earth System

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May be only taken once for credit, limited to 3 attempts (N3)

Max Allowable Credits:

9

Default Grade Mode: Undergraduate Regular

Recommended Prerequisite(s):

Recommended Corequisite(s):

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

GGS 426

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:

Theory and methods for remote sensing features and phenomenon comprising the Earth system. Topics include surface and atmospheric information retrieval, radiation budgets, atmospheric gas detection, mapping the cryosphere, measurements of vegetation and biomass, soil moisture, and precipitation. Focus on satellite-based systems, with applications to both passive and active sensor systems.

Justification:

This course was offered as a special topics course in the Spring of 2019. The course is designed to add additional depth in the departments' remote sensing offerings. This undergraduate course will be added to our advanced techniques course offerings in both the GEOG BS and GIS minor

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

Learning Outcomes:

Attach Syllabus
RS_envir_proposal.pdf

Additional Attachments

Staffing:
This course has been designed by Dr. Donglian Sun. It is intended as a team-taught course, with a rotating instructor of record that is responsible for 50% of course content. Other GGS faculty with remote sensing experience will contribute a session each semester taught. This includes the following faculty: Dr. Donglian Sun, Dr. John Qu, Dr. Paul Houser, Dr. Ron Resmini, Dr. Arie Croitoru, and Dr. Konrad Wessels

Relationship to Existing Programs:
GGS 429 will be offered as an Advanced Techniques course in the BS GEOG degree, and as an elective in the GIS minor.

Relationship to Existing Courses:
This course expands the depth of remote sensing course offerings in GGS. After students develop a background in remote sensing in GGS 379, and physical properties in GGS 426, GGS 429 is a course that will develop further remote sensing techniques.

Additional Comments:

Reviewer Comments

Key: 16884

Geography and Geoinformation Science

SYLLABUS

GGS 429 / GGS 629: Remote Sensing of the Environment and Earth System

Classroom/Time and office hours
EXPL XXXX, TBA
Office hours TBA

Course Instructors
Dr. Donglian Sun (main)
Dr. John Qu, Dr. Paul Houser, Dr. Ron Resmini, Dr. Arie Croitoru, and Dr. Konrad Wessels

GENERAL INFORMATION

Catalog description
Theory and methods for remote sensing features and phenomenon comprising the Earth system. Topics include surface and atmospheric information retrieval, radiation budgets, atmospheric gas detection, mapping the cryosphere, measurements of vegetation and biomass, soil moisture, and precipitation. Focus on satellite-based systems, with applications to both passive and active sensor systems.

Course overview
This course is designed to give students with Earth science and remote sensing background a thorough introduction and overview to the theories and application of remote sensing to environmental and Earth systems, such as surface and atmospheric information retrieval, including surface radiation budget, aerosols, air quality, snow/ice, surface temperature, soil moisture, precipitation retrieval from passive and active satellite observations. The main emphasis of this course is satellite remote sensing of the Earth surface and atmospheric parameters and applications. Selected topics are planned (see calendar) but can be modified according to students' interests. Project presentation and paper (20 pages including figures and tables) are required.

This course is designed as a team-taught class, which will be taught by our remote sensing team, including Dr. Donglian Sun, Dr. John Qu, Dr. Paul Houser, Dr. Ron Resmini, Dr. Arie Croitoru, and Dr. Konrad Wessels. The instructor of record will be in

charge of 50% lectures and other faculty will teach one set related to individual expertise area. The main instructor will rotate.

Prerequisite

GGS 429 requires GGS 426 as a prerequisite. GGS 629 has a recommended prerequisite of GGS 626.

COURSE MATERIALS

Course on-line materials

The GGS 429/629 course site is at https://courses.gmu.edu, where all announcements, class materials, exams and grades will be posted.

Textbooks

In this course textbooks are used as **reference material**. A list of books is provided, so the students can select the one that adapts better to their needs.

- Emilio Chuvieco. Fundamentals of Satellite Remote Sensing: An Environmental Approach. CRC Press, Second Edition. ISBN 9781498728058
- Shunlin Liang. Quantitative Remote Sensing of Land Surfaces. John Wiley & Sons, ISBN:9780471281665 |Online ISBN:9780471723721 |DOI:10.1002/047172372X
- Campbell, J.B. and Wynne, R. H. 2011. Introduction to Remote Sensing. Guildford Press, New York. 5th Edition. ISBN 978-1-60918-176-5
- Jensen, J.R., Remote Sensing of the Environment - An Earth Resource Perspective, 592 pp., Prentice Hall, Upper Saddle River, NJ, 2007. ISBN: 0131889508, Second Edition
- Jones H.G., Vaughan R.A. Remote Sensing of Vegetation: Principles, Techniques, and Applications. Oxford University Press. ISBN-10: 0199207798; ISBN-13: 978-0199207794
- Richards, J. A. 2013. Remote Sensing Digital Image Analysis. An Introduction. Springer-Verlag, Berlin, Heidelberg. Fifth Edition. ISBN 978-3-642-30061-5
- Chuvieco, E. and Huete, A. 2010. Fundamentals of Remote Sensing. CRC Press (Taylor & Francis Group), Boca Raton (Florida). ISBN 978-0-415-31084-0

GRADING AND ASSESSMENT

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

Undergraduate		Graduate	
100-96 A+	79-77 C+	100-96 A+	79-70 C
95-93 A;	76-73 C	95-93 A;	< 69 F

92-90 A-;	72-70 C-	92-90 A-;	
89-87 B+	69-60 D	89-87 B+	
86-83 B	< 59 F	86-83 B	
82-80 B-		82-80 B-	

Attendance, Participation and Preparation (10% Graduate, 15% Undergraduate)
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.

Homework (20% Graduate, 25% Undergraduate)
Students will be divided in groups of 3-4 students. In answering homework, students are encouraged to use for their research any sources they believe appropriate. Students will be asked to provide an oral summary of their findings in class.

Midterm (15% Graduate, 15% Undergraduate)
The midterm covers material from both lectures and assignments. This is an individual, closed book, in class exam.

Final exam (15% Graduate, 15% Undergraduate)
The final exam covers material from both lectures and assignments. This is an individual, closed book, in class exam.

Final Project (40% Graduate, 30% Undergraduate)
Each student will complete a final project. Graduate student projects will be more in depth and require a presentation during the last day of the course. More details will be provided during the semester.

Graduate student work
Graduate students are expected to complete course deliverables at an appropriate, graduate level. The final project will be larger in scope than that of undergraduates. Details will be provided during the semester.

ADMINISTRATIVE POLICIES

Policy on Absence

Students are expected to actively participate in the lecture 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 make-up 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.

GMU email accounts

Students must use their Mason email accounts-either the existing MEMO system or a new MASONLIVE account to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.

Honor Code

Students must strictly follow the honor code, both for individual and teamwork. No exception will be made. University policy requires that faculty members report incidents of Honor Code Violation. Scholastic dishonesty includes but is not limited to plagiarism (reference your sources and quotations), copying others' work, limiting others' access to course materials, sabotaging others' work, turning in the same paper or project for two classes without permission from all instructors, and many other things. You are

responsible for the GMU Scholastic Honor Code, found in the GMU University Catalogue.

Students with Disabilities

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703/993-2474. All academic accommodations must be arranged through that office.

Student use of electronic devices

The use of computers, either lab desktops or personal laptops, is required for the course. You will only be permitted to work on material related to the class, however. Engaging in activities not related to the course will result in a significant deduction in your participation grade. Please be respectful of your peers and instructor and avoid email, social media, and other distracting uses of computers.

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.

COURSE SCHEDULE

Date	Topic
Week one	Remote sensing of surface and atmosphere radiation budget (Sun)
Week two	Remote sensing of gases in chemical clouds (manmade and natural) (Resmini)
Week three	Remote sensing of atmospheric water vapor (Sun)
Week four	Remote sensing of climate change (Qu)
Week five	Remote sensing of air quality (Tong)
Week six	Object extraction and classification from satellite observations (Croitoru)
Week seven	Remote sensing of vegetation and biomass (Wessels)
Week eight	Remote sensing of surface temperature (SST, LST, IST) (Sun)
Week nine	Remote sensing of surface albedo and emissivity (Sun)
Week ten	Snow cover mapping and monitoring from satellites (Guest)
Week eleven	Remote sensing of ice and cryosphere in polar region (Houser)
Week twelve	Precipitation retrieval from satellite observations (Sun)

Week thirteen	Remote sensing of soil moisture (Sun, Qu)
Week fourteen	Remote sensing of evapotranspiration (ET) (Sun)
Week fifteen	Project presentation/reading day
Week sixteen	Project paper due