Course Change Request

New Course Proposal

Date Submitted: 01/13/18 6:27 pm

Viewing: GGS 379 : Remote Sensing

Last edit: 01/16/18 11:27 pm

Changes proposed by: dpfoser

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

No

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. 01/16/18 11:29 pm Dieter Pfoser (dpfoser): Approved for GGS Chair

Effective Term:	Fall 2018		
Subject Code:	GGS - Geography & Geoinformation Science	**Course Number:**	379
Bundled Courses:			
Equivalent Courses:	GGS 412 - Air Photography Interpretation		
Catalog Title:	Remote Sensing		
Banner Title:	Remote Sensing		
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)		
Default Grade Mode:	Undergraduate Regular		
Recommended Prerequisite(s):			

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:

Foundations of remote sensing, and of processing, analyzing, and using remotely sensed data for monitoring the earth. Introduces key concepts in electromagnetic radiation, passive (panchromatic, multi-, and hyper-spectral) and active (microwave and Lidar) sensor systems, and methods for information extraction, including image interpretation and analysis, measurement and rectification, classification, and digital image processing.

Justification:

GGS has an introductory remote sensing course at the graduate level (GGS579).
We would like to introduce a similar course at the undergraduate level.

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

Learning Outcomes:

Attach Syllabus (PDFs only)

Syllabus_GGS379.pdf

Additional Attachments (PDFs only)

Staffing:

While it can be taught by current faculty, GGS is currently in the process of hiring a junior remote sensing faculty.

Relationship to Existing Programs:

Will be part of the Advanced Techniques core in BS in Geography program.

Relationship to Existing Courses:

Undergraduate version of GGS579

Additional Comments:

Reviewer Comments

Key: 15797

GGS 379 – Remote Sensing

Syllabus

Instructor: tbd

Course description and objective: This course is intended to provide an introduction to remote sensing of the environment, with particular attention to the role of electromagnetic energy and specifically focusing on systems that are used to monitor the earth's land surfaces and oceans. It will introduce the basic principles of image interpretation, remote sensing, and digital data processing in relation to optical and thermal remote sensing systems. Examples of remote sensing applications will be presented along with methods for obtaining quantitative information from remotely sensed images.

- *Introductory Concepts*
  - Energy Sources
  - Energy Interactions
  - Remotely Sensed Data/Imagery
  - Remote Sensing Systems
- *Photographic and Photogrammetric Principles*
  - Film-Based Imaging; Cameras
  - Filters
  - Electronic Imaging
  - Geometric Characteristics of Photographs
- *Image Analysis and Interpretation*
  - Fundamentals
  - Various Applications
- *Digital Image Processing: Summary & New Concepts*
  - Image Enhancement
  - Image Manipulation
  - Information extraction; Applications
- *Multispectral Remote Sensing/Thermal Imaging*
  - Physical principles
  - Algorithms
  - Information extraction; Applications
- *Hyperspectral Remote Sensing*
  - Physical principles
  - Algorithms
  - Information extraction; Applications

- *Remote Sensing Systems/Hardware; Airborne and Satellite*
  - AVIRIS
  - Landsat
  - SPOT

Other Earth Resource Sensors

- *Microwave and Lidar Sensing*
  Physical principles
  Systems and sensors
  Information extraction; Applications

Additional Information

- *Textbook (example):*
  Remote Sensing and Image Interpretation, 7th Edition, 2015,
  by Lillesand, Kiefer, and Chipman, John Wiley & Sons, publ.

- *Software:*
  ENVI® v5.3 (or v5.x) (I suggest you purchase a student license but you have access to this software in Exploratory Hall 2312. I'll say more about this at the first class meeting.)

- *Assignments:*
  Weekly

- *Exams:*
  One midterm exam
  One comprehensive final exam

- *Grading:*
  25% assignments, homework
  30% midterm exam
  25% final exam
  20% mini-project

- *Grading Policy:*
  Grading will follow university policy.

From the online GMU University Catalog:
http://catalog.gmu.edu/policies/academic/grading/#text

Scroll down to: 'AP.3.1 Undergraduate Grading' and see the following:

"University coursework is measured in terms of quantity and quality. A credit normally represents one hour per week of lecture or recitation or not fewer than two hours per week of laboratory work throughout a semester. The number of credit hours is a measure of quantity, while the grade is a measure of quality. Faculty of record must assign a grade to all enrolled students at the end of the semester, term or part of term."

Letter Grade	Quality Points	Status
A+	4.00	Passing
A	4.00	Passing
A-	3.67	Passing
B+	3.33	Passing
B	3.00	Passing
B-	2.67	Passing
C+	2.33	Passing
C	2.00	Passing
C-	1.67	Passing
D	1.00	Passing
F	0.00	Failing

For this course, letter grades are based on the following numerical score ranges:

Letter Grade	Percentage Points
A+	100.0 – 97.0
A	96.9 – 93.0
A-	92.9 – 90.0
B+	89.9 – 87.0
B	86.9 – 83.0
B-	82.9 – 80.0
C+	79.9 – 77.0
C	76.9 – 73.0
C-	72.9 – 70.0
D	69.9 – 60.0
F	≤ 59.9

- *Important websites:*

  USGS EarthExplorer: http://earthexplorer.usgs.gov/
  NASA Earth Observatory: http://www.earthobservatory.nasa.gov/
  NASA Earth Science Enterprise: http://www.earth.nasa.gov/
  NASA GSFC Landsat programs: http://landsat.gsfc.nasa.gov/
  USGS Landsat Program: http://landsat7.usgs.gov/
  EROS Data Center: https://eros.usgs.gov/usa
  ASPRS homepage: http://www.asprs.org/

- *Important journals (there are many others, too):*

  Remote Sensing of Environment (RSE)
  ASPRS Photogrammetric Engineering & Remote Sensing (PE&RS)
  IEEE Transactions on Geosciences and Remote Sensing (IEEE TGARS)
  International Journal of Remote Sensing (IJRS)

- *Other textbooks that are great remote sensing references (but **not** required):*

Adams, J.B., and Gillespie, A.R., (2006). Remote Sensing of Landscapes with Spectral Images: A Physical Modeling Approach. Cambridge University Press, 362 p.

Campbell, J.B., (2007). Introduction to Remote Sensing, 4th edition. The Guilford Press, New York, NY, 626 p.

Jensen, J.R., (2007). Remote Sensing of the Environment: An Earth Resource Perspective. 2nd edition. Prentice Hall Series in Geographic Information Science, Upper Saddle River, NJ, 608 p.

Jensen, J.R., (2005). Introductory Digital Image Processing. 3rd edition. Prentice Hall Series in Geographic Information Science, Upper Saddle River, NJ, 544 p.

Landgrebe, D.A., (2003). Signal Theory Methods in Multispectral Remote Sensing. Wiley-Interscience, John Wiley and Sons, New Jersey, 508 p.

Richards, J.A., (2013). Remote Sensing Digital Image Analysis, An Introduction, 5th Edition. Springer, Berlin, 494 p.

Sabins, F.F., (2007). Remote Sensing: Principles and Interpretation, 3rd Edition. Waveland Pr. Inc., 512 p.

Schott, J.R., (2007). Remote Sensing: The Image Chain Approach. 2nd Ed., Oxford University Press, New York, 688 p.

- *Schedule and textbook reading assignments **(tentative; the schedule may change)**:*

Week	Lecture Topic(s)	Lillesand et al. Chapter(s)
1	Intro. to course and intro. to remote sensing	1, Appendices
2	Physical principles of remote sensing	1, Appendices
3	Physical principles of remote sensing	1, 2
4	Photographic Principles and Photogrammetry	2, 3
5	Image Analysis/Imagery Interpretation	7
6	Image Analysis/Imagery Interpretation	7
7	Image Analysis/Imagery Interpretation	7, 4
--	**Spring Break**	--
8	**Midterm Exam**	--
9	Exam Review/Earth Resources Satellites	4, 5
10	Thermal and Multispectral Remote Sensing	4
11	Hyperspectral Remote Sensing	4, sec. 5.13
12	Visual Image Interpretation and Application	8
13	Lidar Remote Sensing	6
14	SAR/Radar Remote Sensing	6
15	**Final Exam**	Exam due by 7:15 p.m.

Academic Integrity/Honor Code: Students are expected to review and abide by the GMU Honor Code (http://oai.gmu.edu/the-mason-honor-code/).