Department of Geography and Geoinformation Science

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GGS 550
Geospatial Science Fundamentals
Fall 2015

1. General Information

Instructor: Dr. Arie Croitoru
Teaching Assistant: TBA
Where: Fairfax Campus, Exploratory Hall 2103.
When: Thursday 4:30pm to 7:10pm.
Course website: Blackboard
Credits: 3.0
Instructor's Office Hours: Mon 10:00am - 11:00am, Tue 3:30am - 4:30pm or by appointment
Preferred contact method: email via Blackboard only (I will respond during regular business hours, Monday to Friday)
TA's Office Hours: TBA

2. Course Goals

Spatial data and geospatial science have become a fundamental component in numerous application areas, ranging from homeland security to environmental, transportation, health, and marketing applications. The primary objective of this course is to review key foundations and principles in geospatial sciences, with a particular emphasis on both the theoretical and methodological aspects of spatial data acquisition, modeling, interpretation, and analysis. In particular, the goals of this course are:

- **A.** Provide an understanding of the fundamentals and theory of geospatial sciences.
- **B.** Introduce key analytical techniques and tools that are used in geospatial science.
- **C.** Develop the ability to describe, evaluate and apply selected processing methods.
- **D.** Identify and gain insight into some of the emerging trends in geospatial sciences.

3. Learning Outcomes

By the end of the course each student will:

- **A.** Have a broad knowledge-base on fundamentals, theory and techniques in geospatial science.
- **B.** Be able to articulate and effectively communicate the basic concepts and ideas related to spatial data and geospatial science to domain experts, non-experts, and other professionals.
- **C.** Appropriately apply principles and perform basic computation and analysis tasks for various hypothetical and real-world tasks in geospatial science.

4. Delivery Method

The course will be taught as a combination of lectures, topic/problem oriented discussion, and tutorials based on assigned reading and class discussion.

5. Textbooks

The following book is a required textbook for this course: "*Manual of Geospatial Science and Technology, 2nd Edition*", edited by J. D. Bossler, CRC Press. This book is available online as an eBook through Mason's library, and will be used as the primary reading resource. Additional resources will be made available throughout the semester.

6. Course outline (tentative)

In this course we will cover the topics listed in the table below. Please note that the topics and their order are subjected to change at the discretion of the instructor (any changes will be announced in class).

Week of	Topic	Assignment	
		Release	Due
9/3	Overview and introduction		
9/10	Coordinates and coordinate systems		
9/17	Datums and reference systems	1	
9/24	Geospatial Data modeling (GS - TBD)		1
10/1	Spatial data acquisition methods **(Exam 1)**	2	
10/8	Introduction to remote sensing (GS - TBD)		2
10/15	Remote sensing data analysis	3	
10/22	Image interpretation & photogrammetry (GS - TBD)		3
10/29	Introduction to Geographic Information Systems **(exam 2)**	4	
11/5	Spatial data analysis methods – vector		4
11/12	Spatial data analysis methods – raster (GS - TBD)	5	
11/19	Introduction to spatial data structures		5
11/26	*** No Class (thanksgiving) ***		
12/3	Ethical issues in Geospatial Science	6	
12/10	Summary and conclusion **(exam 3)**		6

Please note: The course is planned to include several guest presentations during the semester. The dates and topics of the will be announced in class. The materials covered in guest presentations will be considered part of the course materials, and will be included in exam and/or assignments as appropriate.

7. Course Expectations

- This is a science course that involves the use of some mathematical and statistical concepts, as well as basic data processing.
- Your work should show attention to detail, and should reflect graduate level course-work work at the College of Science.
- I expect preparation and participation at every class. Attendance is critical (attendance may be verified during class) - you are expected to be at all classes and to make productive use of class time. Your active participation in the class is essential to the success of this course.

8. Grades

During the course you will be responsible for completing several written assignments and in-class exams. In addition, you will be required to write a blog and to actively participate in class discussions. Each assignment and written exam will be given a numerical grade on a 0-100 scale, and some assignments may include bonus tasks. At the end of the class all the marks will be totaled as a weighted average according to the following percentages:

Assignments	**45%**
In-class written exams (3×15)	**45%**
Class participation	**10%**
Total	**100%**

Please note that, in general, assignments will not have the same weight. The weight of each individual assignment will be indicated on the assignment form. Final grades at the end of the course will be assigned using **a combination of absolute achievements and relative standing in the class**.

Incomplete grades policy: following the university policies, an "Incomplete" grade (IN) may be assigned to a student who is passing a course but who may be unable to complete scheduled course work due to a cause beyond reasonable control. Any requests for an incomplete grade must be submitted in writing during the last week of the course, and should clearly demonstrate "a cause beyond reasonable control". IN grade requests will be evaluated on a case-by-case basis.

If an incomplete grade is granted, it is **your responsibility** to make proper arrangements for completing any missing work as well as to submit it to the instructor by the due date, as indicated by the Registrar's office (see http://registrar.gmu.edu/topics/incomplete/)

9. Exams

The course includes mandatory written exams, as indicated by the course schedule. The material covered in the exams will be announced in class. A student who cannot write a course examination due to a cause beyond reasonable control can request (in writing) extension of time to complete an assignment.

10. Assignments:

The course will include several mandatory written assignments on selected topics from the material covered in class and in the assigned reading. Typically, one to two weeks will be allocated for every assignment (please see Section 11 for details on late submission policies). Submission of assignments should be done only **through the Blackboard course website**.

Please note: Unless noted otherwise, we will only grade assignments that are submitted through the "Assignments" section of the Blackboard system. Please DO NOT email assignments directly to the instructor's or the TA's @gmu.edu or through their Blackboard email.

11. Late work policy:

Assignment submitted between 1 to 3 calendar days past the due date would result in a late penalty of **5 points per day**. As a general rule, assignments submitted after **more than 3 days will not be accepted** and incomplete assignment work may not be completed after the due date. Exceptions to this policy may be made under special circumstances on a case-by-case basis at the discretion of the Instructor.

Please note: Deferral of course work is a privilege and not a right; there is no guarantee that a deferral will be granted. Please make sure you notify the instructor or the teaching assistant in writing as soon as you know a deferral is required.

12. Course website:

The course has a Blackboard website. This website will provide you a single portal through which you may obtain lecture notes, retrieve assignment data and, review links to additional materials, and receive special announcements. You are required to visit the course website **regularly**. Please notify ITU (and, if necessary, the instructor) if you encounter any problems accessing this website.

13. Electronic communication:

All course related email correspondence, including submission of assignments, should be made through the course Blackboard website. Please DO NOT email the instructor or the TA through their @gmu.edu address.

14. Students with special needs:

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS - http://ods.gmu. Please do not hesitate to contact me regarding your special needs if you encounter any issues.

15. **Academic integrity:**
    George Mason University is committed to the **highest standards** of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the **GMU honor code** (online at academicintegrity.gmu.edu).

16. **Other useful campus resources:**
    a. **University Libraries -** University Libraries provides resources for distance students. [See http://library.gmu.edu/distance].
    b. **Writing Center -** The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See http://writingcenter.gmu.edu]. You can now sign up for an Online Writing Lab (OWL) session just like you sign up for a face-to-face session in the Writing Center, which means YOU set the date and time of the appointment! Learn more about the Online Writing Lab (OWL) (found under Online Tutoring).
    c. **Counseling and Psychological Services -** The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].
    d. **Family Educational Rights and Privacy Act (FERPA) -** The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See http://registrar.gmu.edu/privacy].

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported by the instructor.

Notice: Recording of any kind (audio, video) in class or redistribution of class materials is permitted **only** with the prior written consent of the professor or if recording is part of an approved accommodation plan.

General guidelines for assignment preparation and submission

(For detailed instructions please refer to the course website)

Grades of assignments will be based on:

a) **Academic merit** of your answers.

b) **Conciseness** and **completeness** of your answers. Please write to the point and explicitly address the question or task. Avoid using unnecessary graphics (figures, tables, graphs etc.) unless they serve a specific purpose and are referred to in the text. Make sure to use captions and to refer to the graphics you include in your written answer. Graphics without any reference or accompanying explanation will be disregarded.

c) **Presentation**. Remember that your assignment report is a reflection of your thinking and learning process. Please organize your report in a logical fashion so that your answers could be easily identified. A general format for your presentation should, as a minimum, include the following components: (1) a cover page clearly indicating your name, the course number, the assignment number, and the submission date (2) Question number, (3) Your written answer and/or description and discussion of your results, and (4) Visualization of your results, e.g. images, graphs, tables, as necessary.

d) **Organization**. Your assignment should be submitted as a single PDF file containing your assignment report. If you are required to submit multiple files all files (including the report) should be submitted in a single ZIP file.

Additional hints:

1. Please remember that your assignment is a **professional document**, and should therefore be formatted and constructed accordingly. All assignments are to be typed. Hand-written assignments – or scanned hand-written documents – will not be accepted.
2. Submission of a softcopy of your assignment will be made through Blackboard. It is **not** required to submit a hardcopy of your assignment. The submission date of your assignment is the submission date indicated by Blackboard.
3. The electronic submission of your assignment report should be made in a PDF format. Please do not submit MS-Word files!
4. Avoid using screenshots whenever possible. Instead use the print option in the software you are using to produce a PDF document or an image.
5. If more than one file is submitted, you may submit a single **ZIP** file containing all the assignment files. Please note that other compression formats (e.g. rar files) will not be accepted.
6. Please make sure you have a backup of all the materials you submit.