# GGS 740 – 001, (CRN 73007), Hyperspectral Imaging Systems

## Fall Semester 2025 - Credit Hours: 3

**Description:** This course will provide students with the concepts, principles, and methods of earth remote sensing with hyperspectral imaging (HSI) technology in the visible through longwave infrared regions of the electromagnetic spectrum. Course emphases will be on scientific principles, algorithms, hands-on data analysis, and applications of HSI technology to real world problems. Specific topics to be covered include hyperspectral image formation, the nature of HSI data, data analysis and exploitation methods and techniques, data collection systems and system tradeoffs, and data conditioning/calibration. HSI data analysis and exploitation methods to be discussed include: data visualization (in hyperspace; the interpretation of scatter plots), algorithms (e.g., spectral angle mapping, spectral mixture analysis/subpixel analysis, spectral matched filters, and other techniques), atmospheric compensation, and product generation/export. Applications and case studies will be drawn from (but not limited to) the environmental, geological, and agricultural arenas. Ground, airborne, and spaceborne HSI systems will be covered.

**Course Objectives:** To provide students with an introduction to modern hyperspectral imaging remote sensing techniques and the fundamental science underpinning this technology. The course will: (1) prepare the student to undertake graduate research in HSI remote sensing and related areas; (2) prepare the student to participate in professional activities in HSI technology; (3) broaden the student’s background in the general field of spectral remote sensing and image processing; and (4) prepare the student to independently discover applications of this important enabling technology to areas of interest to potential end users of HSI data and products.

**Prerequisites:** An introductory course in remote sensing or digital image processing; other academic or industrial/professional experience in remote sensing; or permission of instructor.

**Required Materials:** The ENVI software package (ENVI + IDL) for which a temporary license will likely be provided. I’ll have more to say about this at our first class meeting.

**Textbook:** *Hyperspectral Imaging Remote Sensing: Physics, Sensors, and Algorithms* by Manolakis, Lockwood, and Cooley, Cambridge University Press, 1st ed., 2016, ISBN-13: 978-1107083660. This book is used in the course for reference; it is not the basis of the curriculum.

**Grading:** Mid-Term Take-Home Exam – 25%; Take-Home Final Exam – 25%

 Homework Assignments – 50%

**Instructor:** Dr. Ronald G. Resmini

 Office: 2208 Exploratory Hall, Office Hours: Thurs., 3:30 to 4:30 p.m. and by appointment

 Phone: (703) 470-3022; e-mail: rresmini@gmu.edu

**Class:** Fairfax campus, Exploratory Hall, room 2310, Thursdays, 4:30 p.m. to 7:10 p.m.

 First day of class: 28th of August and last day of class: 11th of December 2025.

Taken entirely from: <https://ctl.utexas.edu/chatgpt-and-generative-ai-tools-sample-syllabus-policy-statements> (and with several modifications):

“Students are encouraged to use any AI/ML platforms, tools, resources, etc., to help prepare for and complete assignments in GGS 740. I also welcome you to use AI/ML tools to help revise and edit your work (e.g., to help identify flaws in reasoning, spot confusing or underdeveloped paragraphs, or to simply fix citations). When submitting work, students must clearly identify any results & analyses, writing, text, or media generated by AI."

## ****From: https://stearnscenter.gmu.edu/home/gmu-common-course-policies/****

## ****Common Policies Affecting All Courses at George Mason University****

**Updated August 2025**

These four policies affect students in all courses at George Mason University. This Course Policy Addendum must be made available to students in all courses (see [Catalog Policy AP.2.5](https://catalog.gmu.edu/policies/academic/course-information/#AP-2-5)).

**Additional policies** affecting this course, and additional resources or guidance regarding these policies, may be provided to students by the instructor.

### **Academic Standards**

Academic Standards exist to promote authentic scholarship, support the institution’s goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

* **Honesty:**Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
* **Acknowledgement:** Giving proper credit for all contributions to one’s work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
* **Uniqueness of Work:** Ensuring that all submitted work is the result of one’s own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is [outlined in the university’s procedures](https://academicstandards.gmu.edu/). Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University’s academic community.

**Student responsibility:**Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

### **Accommodations for Students with Disabilities**

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <https://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

**Student responsibility**: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor in advance of any relevant class meeting, assignment, or exam.

### **FERPA and Use of GMU Email Addresses for Course Communication**

The [Family Educational Rights and Privacy Act (FERPA)](https://studentprivacy.ed.gov/ferpa) governs the disclosure of [education records for eligible students](https://registrar.gmu.edu/ferpa/) and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

**Student responsibility**: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

### **Title IX Resources and Required Reporting**

As a part of George Mason University’s commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the “Complainant”) will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see [University Policy 1202](https://universitypolicy.gmu.edu/policies/sexual-harassment-policy/): Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

**Student opportunity**:  If you prefer to speak to someone **confidentially**, please contact one of Mason’s confidential employees in Student Support and Advocacy ([SSAC](https://ssac.gmu.edu/)), Counseling and Psychological Services ([CAPS](https://caps.gmu.edu/)), Student Health Services ([SHS](https://shs.gmu.edu/)), and/or the [Office of the University Ombudsperson](https://ombuds.gmu.edu/).