



## The Department of Applied Information Technology

The Volgenau School of Information Technology & Engineering  
George Mason University  
4400 University Drive  
Fairfax, VA 22030-4444

### IT 488 Satellite Communications Spring 2009

Instructor: Professor Joe Montana

E-mail:

Telephone:

Office Hours:

Teaching Assistant: TBA

**Catalog Description:** Offers appreciation for space environment and implications for space-based operations. Discusses engineering, scientific, political, and legal aspects of space for exploration and exploitation. Presents different uses of space communications and future trends.

**Prerequisites:** The prerequisite for this course are Math 108, IT 300 and IT 341. A grade of "C" or better **must** be achieved in the prerequisite courses **before** a student is qualified to take this course. The prerequisite course must be completed prior to, not concurrently with, this course.

This requirement will be **strictly enforced**. Any student who does not meet the prerequisite requirement will be dropped from the course by the Instructor at the start of the semester and the student will be responsible for any consequences of being dropped.

### **Rationale**

The use of satellites in communications is very much a fact of everyday life, as is evidenced by the many homes which are equipped with antennas, or "dishes," used for reception of satellite television. What may not be so well known is that satellites form an essential part of telecommunications systems worldwide, carrying large amounts of data and telephone traffic in addition to television signals. Satellites offer a number of features not readily available with other means of communications. Features along with discussion underlying technology will form the central core for this course.

## **Objectives**

On successful completion of this course, students will be able to:

- Gain knowledge on the history of satellite communications
- Describe the use of satellites in communications systems for the movement of data, voice and imagery
- Understand how satellites are launched into orbit
- Understand how radio waves travel through the air and vacuum
- Comprehend the underlying theoretical and mathematical foundations of radio link design
- Gain knowledge on the various types of antennae used for transmitting and receiving radio waves
- Understand how satellites are used within networks and other applications such as GPS

## **Textbook**

Satellite Communications, Fourth Edition, Dennis Roddy

McGraw-Hill Professional

- **ISBN-10:** 0071462988
- **ISBN-13:** 978-0071462983

## **Companion website:**

<http://mason.gmu.edu/~jmontana/>

## **Tentative Grading Scheme:**

The grading scale for this course is:

97 - 100%	A+	Passing
93 - 96%	A	Passing
90 - 92%	A-	Passing
87 - 89%	B+	Passing
83 - 86%	B	Passing
80 - 82%	B-	Passing
77 - 79%	C+	Passing
73 - 76%	C	Passing
70 - 72%	C-	<i>Passing</i>
60 - 69%	D	<i>Passing</i>
0 - 59%	F	Failing

Final grades will be determined based on the following components:

**Homework:** 15% (will be assigned for each class session and due the following week-There will be a total of 10 homeworks assigned throughout the semester)

**Midterm I:** 25%

**Midterm II:** 25%

**Final:** 30%

**Class Attendance and Participation:** 5%

**Proposed Schedule (Subject to Change):**

Week	1	Overview, Orbit/Launching Methods	Chap. 1, 2
Week	2	Radio Wave Propagation	Chap. 4; HW1 Due
Week	3	Polarization	Chap. 5; HW2 Due
Week	4	Antennas	Chap. 6; HW3 Due
Week	5	The Space Segment	Chap. 7 HW4 Due
Week	6	Midterm Exam I	
Week	7	Analog Signals	Chap. 9; HW5 Due
Week	8	Digital Signals	Chap. 10; HW6 Due
Week	9	The Space Link	Chap. 12; HW7 Due
Week	10	Midterm Exam II	
Week	11	Satellite Access	Chap. 14; HW8 Due
Week	12	Satellites in Networks	Chap. 15; HW9 Due
Week	13	Satellite Mobile Services	Chap. 17; HW10 Due
Week	14	VSAT's/GPS	Chap. 17
Week	15	Final Exam	

## **Attendance Policy**

Students are expected to attend each class, to complete any required preparatory work and to participate actively in lectures, discussions and exercises. As members of the academic community, all students are expected to contribute regardless of their proficiency with the subject matter.

Students are expected to make prior arrangements with Instructor if they know in advance that they will miss any class and to consult with the Instructor as soon as possible if they miss any class without prior notice. Any student who expects to miss more than one class session is strongly advised to drop the course and take it in a later semester when he/she can attend every class.

Departmental policy requires students to take exams at the scheduled time and place, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to attend a scheduled exam will result in a score of zero (0) for that exam, in accordance with Mason policy on final exams. Students should not make travel plans or other discretionary arrangements that conflict with scheduled classes and/or exams. If the University is closed due to weather or other unforeseen conditions, final exams may be rescheduled – students are strongly advised not to make plans that would prevent them from attending exams.

## **Classroom conduct**

Students are expected to conduct themselves in a manner that is conducive to learning, as directed by the Instructor. Any student who negatively impacts the opportunity for other students to learn will be warned – if disruptive behavior continues, the student will be asked to leave the classroom.

Electronic devices are potential distractions in the classroom environment. Cell phones, pagers and other handheld devices must be turned off or set to "silent" mode and not used while class is in session. Laptop computers and similar devices may be used only if such use is directly related to the classroom activity in progress – for some activities the Instructor may require that such devices not be used in order to maximize student engagement.

## **Honor Code**

All members of the Mason community are expected to uphold the principles of scholarly ethics.

Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to Applied IT graduates are available via the following links:

[ACM Code of Ethics and Professional Conduct](#)

[IEEE Code of Ethics](#)

[EC-Council Code of Ethics](#)

On admission to Mason, students agree to comply with the requirements of the [GMU Honor System and Code](#)<sup>1</sup>. The Honor Code will be strictly enforced in this course. Honor Code cases are heard by a panel consisting of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is **plagiarism** and will not be tolerated. Dean Griffiths has mandated a "zero tolerance" policy for plagiarism within The Volgenau School. The Instructor reserves the right to use manual and/or automated means (including such services as Turnitin.com) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

Students may seek assistance with assigned work (and are encouraged to do so if they feel the need), **provided:**

- The directions for the assigned work do not prohibit such assistance.
- Such assistance is acknowledged in the submitted work, clearly identifying the person(s) giving assistance and the nature of the assistance given.
- Any work to be submitted is prepared entirely and exclusively by the student submitting it. Students are expressly prohibited from sharing any assessable work for this course in any manner with other students (except students assigned as Teaching Assistants or Undergraduate Peer Mentors to this course and the student's section), unless all students involved have had their work graded and returned by the Instructor, or the Instructor has explicitly approved such sharing.

## **Examinations:**

Midterm and Final Exams are intended to test the student's knowledge of the materials discussed in the readings and lectures. The instructor **may** ask a combination of multiple choice and written type of questions. Be prepared to write about the material discussed in class in concise, intelligible English. Examinations are comprehensive over the work performed during the course and the course lecture material. You will be expected to interpret the material of the course, not to repeat it via rote memory. The examinations are intended to enhance the student's classroom experience and challenge the student to correctly apply the course material. The final exam will be held during the scheduled final exam session. (see [http://registrar.gmu.edu/calendars/200910\\_exam.pdf](http://registrar.gmu.edu/calendars/200910_exam.pdf))

Final grades will be posted to <http://patriotweb.gmu.edu>, which is the only vehicle for students to obtain those grades. A student with a "hold" on his/her PatriotWeb account will be unable to access final grades until the hold has been removed by the Registrar.

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<sup>1</sup> Available at [www.gmu.edu/catalog/apolicies](http://www.gmu.edu/catalog/apolicies) and related GMU Web pages.

## **Privacy**

Instructors respect and protect the privacy of information related to individual students.

As described above, issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work other than final exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student.

Faculty and staff will take care to protect the privacy of each student's scores and grades.

## **Disability Accommodations**

[The Office of Disability Services \(ODS\)](#) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

Accommodations for disabled students **must** be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

## **Administrative support:**

Fairfax campus

Ms. Stephanie Katavolos  
Science & Technology II Building, Room 17  
Phone: 703-993-3565

Prince William campus

Ms. Cindy Woodfork  
Bull Run Hall, Suite 102  
Phone: 703-993-8461

## **Religious Holidays**

A list of religious holidays is available on the University Life Calendar page. Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor **at least 2 weeks in advance** of the conflict date in order to make alternative arrangements.

## **Important Dates**

The last day to drop the course with no tuition liability is February 3rd. The last day to drop with 100% tuition liability is February 20th. Please check the GMU academic calendar for further information:

[http://registrar.gmu.edu/calendars/200910\\_sem\\_cal.pdf](http://registrar.gmu.edu/calendars/200910_sem_cal.pdf)

## **Communications:**

Registered students will be given access to a section of the Blackboard Learning System for this course. Blackboard will be used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams.

Communication with the Instructor on issues relating to the individual student should be conducted using Blackboard Mail, GMU email, via telephone, or in person - not in the public forums on Blackboard. Blackboard Mail is the preferred method – for urgent messages, you should also attempt to contact the Instructor via telephone. Federal privacy law and GMU policy require that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you MUST send messages from your GMU email account.

Lecture slides are complements to the lecture process, not substitutes for it - access to lecture slides will be provided in Blackboard as a courtesy to students provided acceptable attendance is maintained.