ECE535 Satellite Communications Topics

Course Syllabus

- **Course Title:** Satellite Communications
- **Course Number:** ECE 535
- **Course Credits:** 3
- **Course Instructor:**
  Dr. Tarief Elshafiey, email: telshafiey@unm.edu, office: EECE 235 C
- **Class Meeting Day(s):** online
- **Course Descriptions and Goals:**

"Satellite Communication Systems provide vital and economical fixed and mobile communication services over large coverage areas. In this course, you learn the fundamentals and the techniques for the design and analysis of satellite communication systems".

- **Program Information**
  Online master's Program in Electrical Engineering – Space Systems
  https://online.unm.edu/online-programs/ee-space-systems-msee.html
  Department of Electrical and Computer Engineering, School of Engineering http://www.ece.unm.edu/
  Contact information: email ecegradapp@unm.edu; phone 505.277.2436

- **Course Information**
  - *Course Objectives:* upon completion of this course, students will be able to:
  - C1. Explain and examine fundamental concepts of frequency allocations, Kepler's laws, satellite different orbits with emphasize on geostationary orbit.
  - C2. Evaluate and criticize different types of losses in satellite communications and how it affects the carrier-to-noise ratio for the uplink, downlink, the combined link and received power at the earth stations.
  - C3. Analyze different satellite access performance metrics and characteristics and apply it to some satellite network applications.

  Course Objectives and Module Objectives are very important for you to know. Each module will have specific learning objectives listed on the Module Overview Page, which are designed to help you meet the Course Objectives. The activities in that module, discussions, assignments, assessments, and project are developed so that you can demonstrate that you have met these objectives.
  - *Prerequisites and Co-requisites:*

- Co-requisites: None
- Prerequisites: ECE 341 and ECE 460/560 or ECE 469/569. The course is offered for students from many disciplines. Hence, the Professor is willing to help any students in the foundations. If a student doesn't take any of the prerequisites will not face any difficulties as the professor is willing to help.
- *Textbook:* "Satellite Communications" Dennis Roddy-McGraw-Hill, 4th edition, ISBN 0-07-146298-8
- ***Additional references:***
- "Handbook on Satellite Communications", International Telecommunication Union, Wiley, 3rd Edition, ISBN: 978-0-471-22189-0
- "The Satellite Communication Applications Handbook" Bruce R. Elbert, Artech House, Inc. 2nd edition, ISBN: 1-58053-490-2

Course Assignments and Exams

- The course assignments should be conducted individually by default.
- Assignments are enumerated, such as A3.2 to be the second assignment in module 03. The assignments can be homework, two exams and a project. Exam problems are randomly generated from the problem pool. Homework problems will come with problem numbers from the end of the chapter problems of the textbook. Homework solutions will be posted on CANVAS after the homework due date.
- Your end of course assignment (in Module 12) will be a related project. To utilize what you've learned, you will select a topic related to the course materials and build a project. The project may be software, or hardware or a combined hardware/software. You will be required to submit a project report and presentation. Your presentation will be available to all your colleagues. A peer-to-peer review is required by everyone. More details will be provided in the project guidelines.
- *Exams* will cover material presented in class and assignments. There are two exams, tentatively scheduled after Module 6 and after Module 11. The exams are open book open notes. However, Proctorio, virtual proctoring, may apply in future semesters.
- *Course Project:* See the project guidelines file for more details.

Homework grading policy:

- You will upload your homework solution to Canvas.
- If you submitted all the homework in time, complete and according to the format, you will get the homework full mark.
- The homework format is nothing but the cover page and one problem per page.
- Homework is assigned after each module and is due on a specific day and time. Each homework is out of 10 points. Late homework is -3 points, not complete is -3 points and not according to format is -2 points. The latest homework is within 24 hours of the due date. Homework will not be considered for grading after the latest submission.

Grading

Weeks	Grading Items	Percentage	Notes
Module 1	Assignments	2%	

Modules 2-6	Assignments	25.5%	Around 5% for each module
	Exam I (M2-M6)	10%	
Modules 7-11	Assignments	27.5%	Around 5.5% for each module
	Exam II (M7-M11)	10%	
Module 12	Project	25%	
Total		**100%**	

Final letter grade --- Below is a *general guideline* for assignment of final letter grades based on the percentage of points received, and in accordance with the weighting of different course components described above.

A+	A	A-	B+	B	B-	C+	C
≥ 95%	≥ 90%	≥ 88%	≥ 85%	≥ 80%	≥ 75%	≥ 70%	≥ 65%

Communication Channels

- *Course-wide in general:* the course home page will display course modules chronologically, the latest modules on the bottom. The important course events will be sent via Announcement, which may send a copy to your UNM email if checked). A discussion board is the place to ask/answer questions, post work, talk to your peers, leave comments, and so on, under different forums and threads.
- *Individual communications:* you can email to telshafiey@unm.edu, having your subject line starting with "ECE535 Summer 2025" (otherwise, the processing can be significantly delayed). You can come to my office if needed by sending email to find a common time slot.
- *7-days rule:* your submitted work (assignments, exams, etc.) will be graded within 7 days. You can check your individual scores at "Grades". If you have any concerns about your grade, you need to request a review via email within 7 days since the grade is made available to you.
- *Instructor response time:* I routinely check the course for postings and/or emails, Monday – Friday (9:00am-5:00pm) and try to watch for emergencies on the weekend. I will try my best to response to your questions within 48 hours.

Course Timing,

- Module 1 will be open on Monday as we ask you to complete some orientation activities during the first two days of the course and to answer all questions in the "Welcome Questionnaire Su2025".
- The course due dates will usually fall on Fridays and Wednesdays or be specified in each Module. Check the course schedule for a full list of due dates.
- We expect that this course will take approximately 12-15 hours per week.

Specific Course Requirements and Technical Requirements

About Computer and Operating Systems

- A high-speed Internet connection is highly recommended.
- Supported browsers include Chrome, Firefox, Edge & IE, and Safari. Detailed Supported Browsers: https://canvasinfo.unm.edu/students/index.html.
- Any computer capable of running a recently updated web browser should be sufficient to access your online course. However, bear in mind that processor speed, amount of RAM and Internet connection speed can greatly affect performance.
- You are required to learn and manipulate the CANVAS platform, to produce screenshots and post them.

About Web Conferencing

- Web conference may be used on this course. More details will be provided in the course. You will need a USB headset (or built-ins) with a microphone. A high-speed internet connection is highly recommended for these sessions. A wireless Internet connection may be used if successfully tested for audio quality prior to web conferencing.
- Web Conferencing and Media Support
  +1 505-277-0857 (M-F 8am-5pm); +1 877-688-8817, UNM CANVAS SUPPORT.

About Requirements for hardware necessary to use Proctorio (not for this semester, summer 2024):

- Portable web camera OR built-in laptop camera
- Microphone headset OR built-in computer/laptop microphone.
- Minimum Internet connection speed of .092 Mbps (.663 Mbps is optimal)
- Minimum recommended RAM of 4GB
- Download of Chrome Browser (free and open)

Procedures for Completing Coursework

- All written work needs to be submitted online. If you have difficulty using a tool to complete work, for the purposes of this course, please contact UNM CANVAS Student Technical Support.
- UNM CANVAS automatically records all students' activities including: your first and last access to the course, the pages you have accessed, the number of discussion messages you have read and sent, web conferencing, discussion text, and posted discussion topics. This data can be accessed by the instructor to evaluate class participation and to identify students having difficulty.

Netiquette

- In following with the UNM Student Handbook, all students will show respect to their fellow students and the instructor when interacting in this course. Netiquette refers to a set of guidelines in online communication that help to ensure positive interactions. For more details, refer to https://canvasinfo.unm.edu/students/index.html.
- In this case specifically, these guidelines seek to keep this online class a positive learning environment for everyone. Take Netiquette suggestions seriously. Flaming is considered a serious violation and will be dealt with promptly. Postings that do not reflect respect will be taken down immediately.

- **UNM Policies**
  - *Copyright Issues* - All materials in this course fall under copyright laws and should not be downloaded, distributed, or used for any purpose outside this course.
  - *Accessibility* - The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides reasonable accommodation for their disabilities. If you have a disability requiring accommodation, please contact Accessibility Services Office in 2021 Mesa Vista Hall at 277-3506 or http://as2.unm.edu/index.html. Information about your disability is confidential.
  - Accessibility Resources Center (Mesa Vista Hall 2021, 277-3506) provides academic support to students who have disabilities. If you think you need alternative accessible formats for undertaking and completing course work, you should contact this service right away to assure your needs are met in a timely manner. If you need local assistance in contacting the Accessibility Resources Center, see <Reiner Martens, martens@unm.edu, ECE Building Room 125 D, (505) 277-1434>.
  - *Academic Misconduct* - You should be familiar with UNM's Policy on Academic Dishonesty and the Student Code of Conduct (https://pathfinder.unm.edu/campus-policies/academic-dishonesty.html) which outline academic misconduct defined as plagiarism, cheating, fabrication, or facilitating any such act.
  - *Graduate Student Resources* - https://grad.unm.edu/resources/