

ESE 342 - Communication Systems

Tuesday & Thursday 3:00 pm to 4:20 pm

Melville Lib W4530

1. Course Staff and Office Hours

Instructor: Harbans Dhadwal

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Office Hours: Tuesday and Thursday, 10:00am to 12:00pm

Other hours by appointment

2. Course Description

Basic concepts in analog and digital communications; signals, spectra, and linear networks; Sampling and pulse modulation; Pulse modulation schemes; Principles of digital transmission; Behavior of analog and digital systems in noise; Channel capacity and channel coding schemes.

Fall, 3 credits

Prerequisites: ESE 206

3. Textbook

B. P. Lathi and Z. Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 5th ed (2018)

4. Course Learning Objectives

Introduce basic concepts and techniques in communication systems. Provide in-depth understanding of analog and digital systems including their behavior in presence of noise.

Upon completing this course, students will achieve the following learning objectives:

- Working knowledge of analog and digital communication systems
- Practice in resolving problems related to analog and digital communications
- Simulation of analog and/or digital communication systems

5. Student Learning Outcomes

Student Outcomes		% contribution
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	70%
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	
3	an ability to communicate effectively with a range of audiences.	

4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal	
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	30%
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	

6. Lecture Topics

Week 1.	Basic concepts in communications: elements of a communication system, classification of signals and systems.
Week 2.	Review of convolution, Fourier series, and Fourier transform. Signal transmission through linear systems. Energy and power.
Week 3.	Amplitude modulation: Baseband and carrier communication.
Week 4.	Generation of amplitude-modulated waves.
Week 5.	Angle modulation: Concept of instantaneous frequency.
Week 6.	Angle modulation: Generation of angle-modulated signals.
Week 7.	Sampling and Pulse code modulation.
Week 8.	Principles of digital transmission. Source coding.
Week 9.	Principles of digital transmission (contd.). Digital modulations.
Week 10.	Behavior of analog systems in presence of noise.
Week 11.	Behavior of analog systems in presence of noise (contd.)
Week 12.	Behavior of digital systems in presence of noise.
Week 13.	Behavior of digital systems in presence of noise. (contd.)
Week 14.	Channel capacity. Channel coding schemes: linear block coding; convolutional codes.

7. Assignments

Software projects will be assigned to enhance understanding of core material.

8. Grading

Course grade will be based project assignments, midterm, and a final examination.

Projects:	20%
Mid-term:	40%
Final:	40%

9. Academic dishonesty

It is expected that any work submitted for grading will be student's original work. Any act of academic dishonesty will be reported to the SBU Committee on Academic Standing and Appeals. Additionally, the student will receive a grade of **F** for the course.

Electronic Communication Statement

Email and especially email sent via Blackboard (<http://blackboard.stonybrook.edu>) is one of the ways the faculty officially communicates with you for this course. It is your responsibility to make sure that you read your email in your official University email account. For most students that is Google Apps for Education (<http://www.stonybrook.edu/mycloud>), but you may verify your official Electronic Post Office (EPO) address at <http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo>.

If you choose to forward your official University email to another off-campus account, faculty are not responsible for any undeliverable messages to your alternative personal accounts. You can set up Google Mail forwarding using these DoIT-provided instructions found at <http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail>. If you need technical assistance, please contact Client Support at (631) 632-9800 or supportteam@stonybrook.edu.

Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or via e-mail at: sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.