



Department of Electrical and Computer Engineering

## ECE 340A Online - Introduction to Communication Systems

Spring 2020

### Course Information

<b>Instructor:</b>	Dr. Tamal Bose Phone: (520) 621-6193 Email: <a href="mailto:tbose@arizona.edu">tbose@arizona.edu</a> ECE Building, Room 256	
<b>Office Hours:</b>	Tuesdays 1500 – 1600 (ECE 256) Thursdays 1400 – 1500 (ECE 530)	
<b>Assistant:</b>	Rozanne Canizales Phone: (520) 621-6193 Email: <a href="mailto:rozannec@email.arizona.edu">rozannec@email.arizona.edu</a>	
<b>Textbook:</b>	“Modern Digital and Analog Communication Systems,” 5 <sup>th</sup> Edition; 2019 Lathi, B.P. and Ding, A., ISBN 9780190686840 I will cross-reference items on the 4 <sup>th</sup> edition as well.	
<b>Course Website:</b>	The course website is hosted on D2L. Please visit it often for information on lectures, assignments, special announcements, supplementary documents, etc. All assignments need to be scanned/photographed and uploaded to the course website in PDF format. Upload only a single file for each assignment. Make sure the quality is good and everything is legible. If you upload multiple times, only the last submission will be kept by the system. File name should be your last name followed first initial followed by HW#. For example, if I were to submit HW#5, the file name would be <b>Bose_T_HW5.pdf</b>	
<b>GTA:</b>	Nick Nguyen <a href="mailto:nicknguyen@email.arizona.edu">nicknguyen@email.arizona.edu</a>  The GTA will grade the homework. Please contact him directly if you have questions or concerns about homework grading. Most homework problems will not be rigorously graded but be checked to ensure that a serious effort was made. Please submit problems so that the presentation is neat and easy to follow. Submit problems in numerical order. If a program is required or used, properly documented source code must be submitted.	
<b>Grading Policy:</b>	Homework	20%
	Exam-I	25%
	Exam-II	25%

Technical Essay	5%
Final Exam	25%

***Note: Homework will be due by 23:59 hours on most Fridays.***

### **Absence and Class Participation Policy**

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/2015-16/policies/classatten.htm>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02>

Participating in course and attending (watching video) lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their healthcare provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

### **Honor Code Statement**

All students enrolled in this class are bound by the University of Arizona Honor Code. Exams will be conducted under a strict interpretation of this code. Violations will be referred to the honor court. For more information on the UA Code of Academic Integrity, please refer to: <http://deanofstudents.arizona.edu/codeofacademicintegrity>.

### **Threatening Behavior Policy**

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

### **Accessibility and Accommodations**

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit <http://drc.arizona.edu/>. If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

## **Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism available at:

<http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

*Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent.* Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions.

Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

## **UA Nondiscrimination and Anti-harassment Policy**

The University is committed to creating and maintaining an environment free of discrimination,

<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

## **Additional Resources for Students**

UA Academic policies and procedures are available at:

<http://catalog.arizona.edu/2015-16/policies/aaindex.html>

Student Assistance and Advocacy information is available at:

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

## **Confidentiality of Student Records**

<http://www.registrar.arizona.edu/ferpa/default.htm>

## **Subject to Change Statement**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

## Detailed Syllabus (Tentative)

Lecture	Date	Lecture Topics	Reading (Chapter), 4 <sup>th</sup> Edition	Reading (Chapter), 5 <sup>th</sup> Edition
Week 1		Course information, introduction, motivation, history; review of basic signals.	1.1-1.6	1.1-1.7
Week 1		Reviews of basic signals, signal classification	2.2-2.4	2.2-2.4
Week 2		Fourier series, examples, properties	2.8, 2.9	2.8, 2.9
Week 2		Signal vs. vectors, correlation, orthogonal signal sets	2.5-2.7	2.5-2.7
Week 3		Fourier transform – properties, examples	3.1, 3.2	3.1, 3.2
Week 3		Fourier transform: more properties, convolution	3.3, 3.4	3.3, 3.4
Week 4		Signal transmission through a linear system, ideal LPF	3.5, 3.6	3.5, 3.6
Week 4		Correlation, Spectral Density: Energy Signals & Power Signals	3.7, 3.8	3.7, 3.8
Week 5		DSB AM	4.1-4.3	4.1-4.3
Week 5		Bandwidth efficient AM, superhet rx	4.4-4.5	4.4
Week 6		Angle modulation; relationship between PM and FM; FM generation; demod	5.1-5.4	4.5-4.7
Week 6		Nonlinear distortion; superhet rx; FM broadcast system	5.5-5.7	4.8-4.9
Week 7		Sampling theory, quantization (uniform & non-uniform)	6.1	5.1
Week 7		PCM	6.2, 6.3	5.2, 5.3
<b>Exam I</b>	<b>TBA</b>	<b>Exam I</b>	<b>Exam I</b>	
Week 8		PCM contd.	6.4	5.4
Week 8		DPCM	6.5	5.5
Week 9		ADPCM	6.6	5.5
Week 9		Delta modulation, vocoders	6.7-6.8	5.6-5.7
Week 10		Line coding, pulse shaping	7.2, 7.3	6.2, 6.3
Week 10		Line coding, pulse shaping contd.		
Week 11		Scrambling, repeaters, eye diagrams	7.4, 7.6	6.4, 6.6
Week 11		M-ary PAM baseband	7.7	6.7
Week 12		M-ary PAM baseband contd.	7.7	6.7
Week 12		Digital carrier systems	7.8	6.8
<b>Exam II</b>	<b>TBA</b>	<b>Exam II</b>	<b>Exam II</b>	
Week 13		M-ary digital carrier modulation	7.9	6.9
Week 14		M-ary carrier modulation (contd.)	7.9	6.9
Week 14		Detectors and demods	Supp. Notes	
<b>Essay</b>	<b>TBA</b>	<b>Essay on Spectrum Sharing</b>	<b>Essay</b>	
Week 15		BER calculations	Supp. Notes	
Week 15		Equalization	7.5	6.5
<b>Final Exam</b>	<b>TBA</b>	<b>Final Exam</b>	<b>Final Exam</b>	