Sirindhorn International Institute of Technology

Thammasat University

School of Information, Computer and Communication Technology

ECS332: Course Syllabus

Semester/Year: 1/2019

Course Title: Principles of Communications
Instructor: Asst. Prof. Dr.Prapun Suksompong (prapun@siit.tu.ac.th)
***Course Website*:** http://www2.siit.tu.ac.th/prapun/ecs332/
Line Group: http://line.me/ti/g/YwoSVmhahT

Lectures

- Wednesday 10:40-12:00 BKD 2602
- Friday 10:40-12:00 BKD 3511
- Friday 13:00-14:20 BKD 3511
  (Tutorial/Make-up; Shared with ECS315)

Office Hours

See Calendar on the course website.

Course Information

Prerequisite: ECS281 Signals and Systems

Corequisite: ECS315 (Probability and Random Processes) or IES302 (Engineering Statistics)

Grading Policy: Coursework will be weighted as follows:

Assignments (HWs)	5%
Class Discussion	5%
In-Class Exercises	10%
Midterm Examination	35%
Final Examination (comprehensive)	45%

- Late assignments will be heavily penalized or rejected.
- Cheating will not be tolerated

Textbook: [C&C] A. Bruce Carlson and Paul B. Crilly, Communication Systems: An Introduction to Signals and Noise in Electrical Communication, McGraw-Hill, 2010, 5th International edition. Call No. TK5102.5 C3 2010. ISBN: 978-007-126332-0.

Course Description: This course introduces the fundamental elements of analog and digital communication systems. The focus will be on the mathematical analysis of the signals in the frequency domain and basic building blocks of communication systems. Topics include AM, DSB, SSB, FM, NB/WBFM, PM, noises in analog communication; binary baseband modulation; Nyquist's sampling theory and quantization; pulse analog modulation. Performance of digital communication systems in the presence of noise will be discussed towards the end. The skills and knowledge gained from this class are essential for other advanced communication courses such as, digital communication systems and mobile communications.

Additional References:

1. [Z&T] Rodger E. Ziemer and William H. Tranter, Principles of Communications, 6th International student edition, John Wiley & Sons Ltd, 2010. Call No. TK5105 Z54 2010.
2. [L&D] B.P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, 4th Edition, Oxford: Oxford University Press, 2009. Call No. TK5101 L333 2009
3. J. G. Proakis and M. Salehi, Communication Systems Engineering, 2nd Edition, Prentice Hall, 2002. ISBN: 0-13-095007-6
4. S.S. Haykin, Communication Systems, 4th Edition, John Wiley & Sons, 2001. Call Number: TK5101 H38 2001.

Assignments: Homework will be assigned throughout the semester. Most assignments will be graded on completeness, not correctness: if an honest attempt was made on an assigned problem, it will be considered complete. Occasionally, part(s) of a selected problem will be graded. Of course, you do not know which problem of which assignment will be selected; so you should work on all of them. The lowest assignment score will be dropped. The complete solutions to all problems (not just answers) will be posted on the course web site.

Class Discussion: The score for this part is judged by the amount of active participation in the class discussion (with the instructor) either inside or outside of the classroom. There will be (self-evaluation) forms for collecting information about this twice (one right after the midterm exam and another one right after the final exam).

In-Class Exercises: In-class exercises will focus on current or recently-discussed topics. An exercise may be given at any time during any class period. Students are expected to work in groups of at most three persons. In-class exercises will be given only to those students who are present. There will be no make-up exercise.

Two lowest in-class exercise scores will be dropped. Additionally, one who has legitimate excuse (such as participating in competition, or university-approved curricular and extracurricular activity, career-related interview, broken bone(s), being admitted to the hospital) may request that the corresponding missing score will not be counted. For such request, supporting document should be submitted to the instructor and the student must explicitly provide the missing exercise number and date in the (self-evaluation) forms.

Exams: A handwritten A4 study sheet is allowed. One side for the midterm exam. Another side for the final exam.

Students should notify the instructor before missing any exam if at all possible and immediately thereafter when not possible. The instructor (and/or the fact-finding committee) will determine if the absence from an exam is legitimate. Simply not feeling well is not a reason to miss an exam. In the case of legitimate absence, an oral and/or written make-up exam could be arranged.

Expectations: You should expect to spend extra 5-8 hours per week studying outside of class. However, the instructor do expect you to come to class and *participate actively* in class discussions. If you must miss a class, you must find out and catch up with what happened in lecture, either from the instructor or one of your classmates. You are responsible for all materials that are discussed in class.

Academic Integrity

The work submitted in this class is expected to be the result of your individual effort. You are free to discuss course material, approaches to problems with your colleagues or the instructor but you should never misrepresent someone else's work as your own.

It is your responsibility to protect your work from unauthorized access. For example, do not discard copies of your codes/assignments in public places.

Course Outline

The following is a tentative list of topics.

1. Introduction to communication systems
2. Frequency domain analysis (Fourier transform and its property)
3. Frequency-shifting (translation), Bandwidth
4. Modulation, , multiplexing, DSB-SC
5. Channel characteristics, distortion, multipath Fading
6. Fourier series and its applications in analyzing modulator and demodulator
7. Energy and power, instantaneous frequency
8. **MIDTERM: 4 Oct 2019 TIME 09:00 - 11:00**
9. Classical DSB-SC Modulators, Amplitude Modulation (AM), envelope detector, Quadrature Amplitude Modulation (QAM)
10. Suppressed-Sideband Amplitude Modulation, Vestigial-Sideband Modulation (VSB)
11. Angle modulation: FM and PM
12. Sampling
13. Reconstruction
14. Analog pulse modulation, inter-symbol Interference, and pulse shaping
15. Pulse Code Modulation (PCM)
16. Digital communication in the presence of noise
17. **FINAL: 11 Dec 2019 TIME 09:00 - 12:00**

Additional Remarks

1) Calculator: Casio FX-991 is permitted in exams and for in-class exercises
2) MATLAB: Computer simulation will be used to enhance learning. MATLAB is available in SIIT computer labs.

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