Syllabus

Instructor: Gayan Aruma Baduge  
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Office: ENGR E-110  
Office Phone: 618 453 4755

Lecture: TR 2:00PM – 3:15PM  
Office Hours: TR 9:00AM – 12:00PM

TA: P. Sai Sudheer (parvathnenisaisudheer@gmail.com)  
<TR 10:00 AM – 11:30 AM, Office: TBD>

Grading/Evaluation:  
- Labs/Individual project: 10%  
- Homework: 20%  
- Group Project: 15%  
- Quizzes: 05%  
- Midterm Exam: 20%  
- Final Exam: 30%

A: 90-100; B: 80-89; C: 70-79; D: 60-69; F < 60
(The requirement on two projects will be higher for graduate students)

Classroom Policies:

A. Attendance Policy: In the event that you cannot attend a class due to a medical or family emergency you must inform the instructor in advance. Attendance will be taken at random throughout the semester. Excessive absences will count against the final grade.

B. Late Homework, Late Project, and Missed Exams: Late homework or projects are not accepted. In the event you cannot attend an exam due to a legitimate reason, you must contact the instructor more than 24 hours before the exam. No make-up exams/quizzes will be given.

1. Course number and name: ECE 478–570 Principles of Communication systems

2. Credits and contact hours: 3 credits, two 75 minute sessions per week

3. Course Committee: L. Gupta, K. Chen, G. Baduge

4. Text book(s), title, author, and year:  

References or other supplemental materials:  
5. **Specific course information**

   a. **Catalog Description:** This course introduces the fundamentals of communication systems. At the completion of this course, students will have an appreciation of how information is transmitted and received over a communication medium in both analog and digital domains. Further, students will be able to understand the representation of communication systems and signals, understand how analog/digital modems operate, their limitations in the presence of noise, and analyze their performance limits in terms of the fundamental metrics. Key topics include: amplitude, frequency, and phase modulation, sampling theorem, pulse code modulation, digital carrier systems and optimum signal detection.

   b. **Prerequisites:** ECE 315 and ECE 355

   c. **Indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:** Elective

   d. **Professional Component [3 Credit Hours]**

      
      | Mathematics | Sciences | General Ed. |
      |-------------|----------|-------------|
      | 0           | 0        | 0           |
      | Eng. Science | 3        | Eng. Design | 0           |

6. **Instructional Objectives**

   Upon completion of the course, the students should be able to:

   a. Be familiar with fundamental building blocks of communication systems

   b. Be familiar with analog and digital modulation techniques

   c. Understand concepts of probability and random processes for communication systems

   d. Understand the impact of noise in communication systems

   e. Understand analog-to-digital conversion for data transmission

   f. Understand the principle and applications of base-band and pass-band transmissions

   g. Be familiar with applications of information theory and coding for communications

7. **Brief list of topics (class, lab and project) to be covered (with hours)**\(^\text{1}\)

   - Representation of Signals and Systems (a review of Fourier theory) {4 lectures}
   - Amplitude Modulation {3 lectures}
   - Angle Modulation {3 lectures}
   - Introduction to Probability Theory and Random Processes {4 lectures}
   - Noise in Continuous Wave Modulation {2 lectures}
   - The Transition from Analog to Digital {2 lectures}
   - Baseband Digital Transmission {4 lectures}
   - Digital Band-Pass Transmission Techniques {4 lectures}
   - Introduction to Information Theory and Coding {2 lectures}

8. **CAD and Computer Tools Used:** Matlab

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\(^1\) subject to change at the instructor’s discretion and progress. Students are responsible for announcements made in class and on D2L.
9. Assessment of the Contribution to Student Outcomes

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<tr>
<th>Outcome</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
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<td>Assessed</td>
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Student Outcomes (ABET criteria a-k) are quoted here:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.