# ABET 2000 Program Learning Outcomes

Engineering programs **must** demonstrate that their graduates have:

(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

(d) an ability to function as an effective team member

(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 and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Computer Engineering Outcomes:

(l) Knowledge of Probability and Statistics and their applications in Computer Engineering

(m) Knowledge of Discrete Mathematics

(n) **The ability to design a system that involves the integration of hardware and software components**

# COE 341 Data and Computer Communications
# Course Learning Outcomes Table

| Course Learning Outcomes | Outcome Indicators and Details | Assessment Methods and Metrics | ABET 2000 Criteria |
|---|---|---|---|
| 1. Ability to apply knowledge of mathematics to understand basic concepts in communication engineering | Application of :<br>• Fourier series and transforms<br>• Spectral power density<br>to understand the following concepts:<br>• Absolute and effective bandwidth of signals.<br>• Filtering and band limiting<br>• Modulation and bandwidth requirements | • Assignments<br>• Quizzes<br>• Exams | A |
| 2. Ability to design basic communication systems, components, and algorithms | The student shall be able to design:<br>• Simple communication links using various types of guided and unguided media.<br>• Hardware for generating CRC error detection codes and performing error detection.<br>• Bit stuffing/unstuffing algorithms for HDLC control.<br>• Basic PCM and Delta modulation systems. | • Assignments<br>• Quizzes<br>• Exams | C |
| 3. Ability to identify, formulate, analyze, and solve basic communication engineering problems | The student shall be able to identify merits and trade offs governing the choices of:<br>• Analog and digital transmission techniques.<br>• Various digital encoding schemes, including bandwidth requirements.<br>• Various error and flow control mechanisms in the data link layer.<br>• Various modulation techniques, including bandwidth requirements.<br>• Various guided and unguided transmission media.<br>• Synchronous and asynchronous transmission.<br>• Data rate, signal power, noise level, bandwidth and error rate. | • Assignments<br>• Quizzes<br>• Exams | E |

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|---|---|---|---|
| 4. Ability to use programming tools and skills for the simulation, analysis, and design of basic communication systems and components | Matlab or LabVIEW-based programming assignments covering one of the following areas:<br>• FFT<br>• Filters<br>• CRC generation and error detection<br>• Generation of digital codes<br>• Modulation and shift keying<br>• PCM and Delta modulation systems<br>• Calculation of bit error rate vs signal to noise ratio curves | • Programming Assignments<br>• Demos | K |
| 5. Ability to demonstrate self learning skills and aptitudes | A term paper on a selected topic in communications that complements/serves the course. | • Term paper<br>• Presentation | I |