Engineering Faculty Document No. 20-06
March 13, 2007

**TO:** The Engineering Faculty
**FROM:** The Faculty of the School of Electrical and Computer Engineering
**RE:** New Undergraduate Level Course: ECE 190

The faculty of the School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**ECE 190 Introduction to Computer and Electrical Engineering**
Sem: Spring. Class: 1; Credit: 1.
Prerequisite: Open only to First Year Engineering students.

This course is intended to provide an introduction to electrical and computer engineering for students in their freshman year. A goal is to provide some historical background of the respective sub-areas within ECE, a description of analytical tools that will be developed throughout their curriculum, the motivation for the tools, and to inform students of elective courses in ECE.

**Reason:** To provide an overview of the fields within electrical and computer engineering. The overview will include an introduction to several analytical, numerical, and experimental tools that students will be expected to master prior to graduation as well as technical challenges that are being addressed in the respective fields.

Mark J. T. Smith
Professor and Head

**Supporting Documentation**

**Required Text:** None

**Recommended References:** None:

**Course Outcomes:**

A student who successfully fulfills the course requirements will have demonstrated

i. Knowledge of the respective areas of electrical and computer engineering
ii.. Knowledge of the history of the respective areas
iii. Knowledge of some essential concepts within each sub-area of ECE

ES&S – Charge and moving charge creating force, electric fields, magnetic fields, energy, efficiency.

FO – Conductors, dielectrics, ferroelectrics, circuit elements (R, L, C), traveling electromagnetic waves.

CNSIP – Information transfer using electromagnetic means. Signals, amplitude modulation, frequency modulation, frequency versus time domain, stochastic processes, biomedical image processing.

Solid State – Semiconductors versus conductors, diodes, transistors, material processing, VLSI.

Computer Engineering – Digital systems, microprocessors, software engineering.

Automatic Control – System regulation, feedback, bandwidth, stability, continuous systems, optimization, discrete systems, hybrid systems.

**Assessment of Outcomes**: Homework and Quiz performance will be used to track student development and lecture effectiveness.

**Engineering Design Content:** None
**Engineering Design Considerations:** None

**Course Outline**

| Topic | Weeks |
|---|---|
| History/Concepts/Ongoing Challenges in ES&S | 2.5 |
| History/Concepts/Ongoing Challenges in Fields/Optics | 2.5 |
| History/Concepts/Ongoing Challenges in CNSIP | 2.5 |
| History/Concepts/Ongoing Challenges in Solid State | 2.5 |
| History/Concepts/Ongoing Challenges in Computers | 2.5 |
| History/Concepts/Ongoing Challenges in Automatic Control | 2.5 |

# ECE 190-Syllabus

## Introduction to Electrical and Computer Engineering

Objective: To provide an overview of the fields within electrical and computer engineering. The overview will include an introduction to several analytical, numerical, and experimental tools that students will be expected to master prior to graduation as well as technical challenges that are being addressed in the respective fields.

Description: Although some students have been introduced to ECE-related topics from friends/relatives or previous courses in physics and mathematics, very few have an idea of what they will face in their ECE education or in the workforce upon graduation. In this course, a history of the field of ECE will be used to introduce students to key concepts they will be expected to master and how the concepts provide the foundation to solve challenging technical problems.

Instructor: Steve Pekarek

Office: Electrical Engineering Building, Office 148

Office Phone: 765-494-3434

Fax: 765-494-0676

Email: spekarek@purdue.edu

Office Hours: WR 3:00-4:30 PM, and by appointment
Text: None (class notes only)

Prerequisite: Freshman Standing – Not open to students enrolled in ECE

Approximate Syllabus:
Weeks, Content, # of lectures (approximate)

| | |
|---|---|
| 1 | Course Outline, Management, Description, Experiments of Oersted, Ampere, Faraday |
| 2 | Electromagnetic Forces, Electromagnetic-Based Energy Conversion |
| 3 | History of Maxwell/Heavyside, Traveling Electromagnetic Waves |
| 4 | Electromagnetic Materials (Conductors, Insulators, Dielectrics, Ferrites) |
| 5 | From Vector to Scalar Models - Dc/Low Frequency Circuits, Oscilloscopes, Multimeters |
| 6 | History of CNSIP - Radio/Television/Radar/Networking |
| 7 | Concept of Time versus Frequency Domain, Fourier Series, Fourier Transform, |
| 8 | Stochastic Versus Deterministic Systems, Signal/Noise Ratio, Modern Communication/Signal Processing |
| 9 | History of Solid State Devices – Semiconductors |

| | |
|---|---|
| 10 | Diodes, Transistors, Nanoelectronics |
| 11-13 | Computer Engineering – Binary Systems, Digital Logic, Microprocessors, Programming Languages |
| 14-15 | Automatic Control – Feedback, Industrial Process Control (Proportional+Integral), Linearity |

Homeworks: Assignments will given each week on Monday. The assignments will be due the by Friday at 4:30. Solutions will be posted on the class website at 5:00 pm on Saturday.

Quizzes: We will have weekly 10 minute quizzes at the end of each lecture that will cover material from 1) the lecture (make sure you are paying attention) and 2) the topic from the previous week/homework (make sure you are understanding). Make-up quizzes given only for medical or family emergencies. Supporting note from physician, mortician required.

Grades: Grades will be based upon the cumulative score of your top 10 quizzes + HW score (HW ~1/11 of total grade).

Academic Dishonesty Policy: All quizzes are to be an individual's own work. Cheating on any quiz will lead to an 'F' for the course.