INSTRUCTIONS: Please check the items below which describe the purpose of this request.

☑ 1. New course with supporting documents
☐ 2. Add existing course offered at another campus
☐ 3.Expiration of a course
☐ 4. Change in course number
☐ 5. Change in course title
☐ 6. Change in course credit/type
☐ 7. Change in course attributes (department head signature only)
☐ 8. Change in instructional hours
☐ 9. Change in course description
☐ 10. Change in course requisites
☐ 11. Change in semesters offered (department head signature only)
☐ 12. Transfer from one department to another

PROPOSED:

Subject Abbreviation: ECE
Course Number: 428
Long Title: Modern Communication Systems
Short Title: Modern

EXISTING:

Subject Abbreviation
Course Number

TERMS OFFERED:
Check All That Apply:
☐ Summer
☐ Fall
☒ Spring

CAMPUS(ES) INVOLVED:
Calumet
Cont Ed
N. Central
Champaign
Tech Statewide
M. Tech
Lafayette
Indians

Abbreviated title will be entered by the Office of the Registrar if omitted. (50 CHARACTERS ONLY)

CREDIT TYPE
1. Fixed Credit: Cr. Hrs.: 3
2. Variable Credit Range:
Minimum Cr. Hrs. (Check One):
☐ Or
☐
Maximum Cr. Hrs.
3. Equivalent Credit: Yes ☐ No ☐

COURSE ATTRIBUTES: Check All That Apply
1. Pass/No Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
Maximum Repeatable Credit:
4. Credit by Examination
5. Special Fees
6. Registration Approval Type
   ☐ Department
   ☐ Instructor
7. Variable Title
8. Honors
9. Full Time Privilege
10. Off Campus Experience

Schedule Type:
Lecture: Minutes Per Night: 75
Recitation: Meetings Per Week: 2
Presentation: Weeks Offered: 15
Laboratory: % of Credit Allocated: 0
Lab Prep:
Studio:
Distance:
Clinic:
Experiential:
Research:
Ind. Study:
Prac/Observ:

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Development of the basic principles of communication systems with emphasis on digital modulated systems. The analysis of the performance of these systems in an additive noise channel is studied so as to make comparisons between the different types of digital modulation systems. The principles of forward error correction are studied along with the concepts of performance bounds and optimum receiver performance. The use of Matlab simulation models is introduced as a companion technique for communication systems analysis.
Pre-requisites: ECE 301 - Signals and Systems, ECE 302 - Probabilistic Methods in Electrical Engineering

Calumet Department Head
Date
Calumet School Dean
Date

Fort Wayne Department Head
Date
Fort Wayne School Dean
Date

Indianapolis Department Head
Date
Indianapolis School Dean
Date

North Central Department Head
Date
North Central Chancellor
Date

West Lafayette Department Head
Date
West Lafayette College/School Dean
Date
West Lafayette Registrar
Date

OFFICE OF THE REGISTRAR
ECE 428 – Modern Communication Systems
Offered in the Fall or Spring semester

2009 Catalog Data
Class: 3. Lab: 0. Credits: 3.

Development of the basic principles of communication systems with emphasis on digital modulated systems. The analysis of the performance of these systems in an additive noise channel is studied so as to make comparisons between the different types of digital modulation systems. The principles of forward error correction are studied along with the concepts of performance bounds and optimum receiver performance. The use of Matlab simulation models is introduced as a companion technique for communication systems analysis.

Prerequisites
ECE 301 – Signals and Systems
ECE 302 - Probabilistic Methods in Electrical Engineering

Prerequisite by Topic
An understanding of signal representation and linear time-invariant systems with their properties, including the analysis and use of filters. Knowledge of Fourier and related transforms and their application in analyzing signals. An understanding of probability theory and its applications in analyzing engineering systems.

Required Textbook

References
None.

Coordinator
Chao Chen, Assistant Professor of Computer Engineering
Carlos Pomalaza-Ráez, Professor of RF Communications

Course Objectives
This course provides an introduction to communication system principles with an emphasis on digital communication systems. It develops the basic analysis tools to characterize a communication system’s performance. The use of computer modeling and simulation techniques employed to compliment analysis methods.

Schedule
Two 75-minute lectures per week

Lecture Topics
1. Review of background material and introduction 2 classes
2. Digital modulation and transmission of digital signals 3 classes
3. Optimum receivers in additive white Gaussian noise baseband channels 3 classes
4. Receiver synchronization 2 classes
5. Transmission through band-limited channels 4 classes
6. Advanced digital modulation signals 2 classes
7. Introduction to information theory and bounds on performance 3 classes
8. Coding for reliable communications 2 classes
9. Review 2 classes
10. Exams 4 classes
Course Outcomes

1. An understanding of how to represent communication signals in time and frequency using complex analysis and Fourier analysis techniques [a, e;1,2]
2. An understanding of the effects of noise and channel properties on communication system performance [a, e;1,2]
3. An understanding of the difference in performance among the basic digital modulation systems [a, c, e;1,2,4]
4. An understanding of the basic functions required of a digital communications receiver [a, c, e;1,2,4]
5. An understanding of the effects of band-limiting and the tradeoffs of performance and capacity [a, c, e;1,2,4]
6. A basic understanding of information theory and bounds on communication system performance [a, c, e;1,2,4]
7. An understanding of the basic forward error correction coding techniques of convolutional and block codes [a, c, e;1,2,4]
8. The application of computer modeling and simulation techniques to compliment communication system performance analysis [a, c, e, k;1,2,4,6]

ABET category: Engineering science: 2.5 credits or 83%
Engineering design: 0.5 credits or 17%

Prepared by: Jim Isaacs Date: April 2, 2009