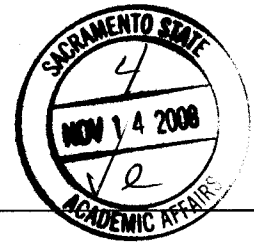




SACRAMENTO  
STATE

# Course Change Proposal Form A



<b>Academic Group (College):</b> Engineering & Computer Science	<b>Academic Organization (Department):</b> Electrical & Electronic Engineering	<b>Date:</b> 10/6/2008
<b>Type of Course Proposal:</b> New ___ Change <u>X</u> Deletion ___	<b>Department Chair:</b> Dr. Suresh Vadhva	<b>Submitted by:</b> Dr. Suresh Vadhva
<b>Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes <u>X</u> No ___</b>	<b>For Catalog Copy: Yes <u>X</u> No ___</b> <b>CCE (Extension): Yes ___ No ___</b>	<b>Semester Effective:</b> Fall ___ Spring <u>X</u> , 2009 ___

<b>This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number):</b>	
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**Change from:**

<b>Subject Area (prefix) &amp; Catalog Nbr (course no.):</b> EEE 185	<b>Title:</b> Modern Communication Systems	<b>Units:</b> 3
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**Change to:**

<b>Subject Area (prefix) &amp; Catalog Nbr (course no.):</b>	<b>Title:</b>	<b>Units:</b>
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**JUSTIFICATION:**

**Prerequisite change only. Chang from EEE180, Engr 120 to EEE 180, Engr 120; Engr 120 can be taken concurrently. The EEE curriculum is undergoing a realignment of courses based on new criteria, program outcomes and objectives for Accreditation (ABET) review. There will be no change to the course description or content.**

**NEW COURSE DESCRIPTION:** (Not to exceed 80 words and language should conform to catalog copy. See <http://www.csus.edu/acaf/univmanual/crspsl.htm> - Guidelines for Catalog Course Description)

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**Note:**

**Prerequisite: EEE 180, Engr 120; Engr 120 can be taken concurrently**  
**Enforced at Registration: Yes X No \_\_\_**

**Corequisite:**  
**Enforced at Registration: Yes \_\_\_ No X**

**CAN (California Articulation Number):**

**Graded: Letter X Credit/No Credit \_\_\_**      **Instructor Approval Required? Yes \_\_\_ No X**

**Course Classification (e.g., lecture, lab, seminar, discussion):**  
C04      **Title for CMS (not more than 30 characters):**  
Modern Communication Systems

**Cross Listed?**  
Yes \_\_\_ No X      **If yes, do they meet together and fulfill the same requirement, and what is the other course.**

**How Many Times Can This Course be Taken for Credit? \_\_\_1\_\_\_**

**Can the course be taken for Credit more than once during the same term? Yes \_\_\_ No X**

**FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:**

**Description of the Expected Learning Outcomes:** Describe outcomes using the following format: "Students will be able to: 1), 2), etc."  
See the example at <http://www.csus.edu/acaf/example.htm>

**\*\*Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.**

**Assessment Strategies:** A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

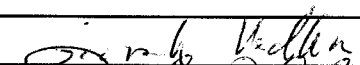
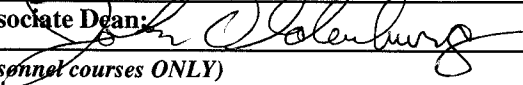
For whom is this course being developed?  
 Majors in the Dept \_\_\_ Majors of other Depts. \_\_\_ Minors in the Dept \_\_\_ General Education \_\_\_ Other \_\_\_  
 Is this course required in a degree program (major, minor, graduate degree, certificate)? Yes \_\_\_ No \_\_\_  
 If yes, identify program(s): \_\_\_\_\_

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes \_\_\_ No \_\_\_  
 If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). \_\_\_\_\_

***The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.***

**Approvals:** If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

Signatures:	Date
Department Chair: 	11/12/2005
College Dean or Associate Dean: 	11/12/2008
CPSP (for school personnel courses ONLY)	
Associate Vice President and Dean for Academic Programs	

**Distribution:** Academic Affairs (original), Department Chair and College Dean. Dean's office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.

# EEE 185 MODERN COMMUNICATION SYSTEMS

## Required Course

**2008 – 2010 Catalog Data:** EEE 185. Modern Communication Systems. Review of signal and system analysis, sampling theorem and Nyquist's criteria for pulse shaping, signal distortion over a channel, study of digital and analog communication systems, line-coding, signal to noise ratios, performance comparison of various communication systems. Prerequisite: EEE 180, Engr 120; Engr 120 can be taken concurrently. 3 units.

**Text:** Lathi, B. P., Modern Digital and Analog Communication Systems, 3rd Ed., New York: Oxford University Press, 1998 (ISBN 0-19-511009-9)

## Course Objectives:

1. Provide the student with an overview of currently used analog and digital communication methods and their relative advantages and disadvantages.
2. Introduce the student to the component parts of currently used analog and digital communication systems.
3. Provide the student with the ability to describe the function of communication system components mathematically and graphically using both time-domain and frequency-domain tools.
4. Provide the student with the ability to apply prerequisite engineering and mathematics tools to the conceptual design of communication systems and the quantitative analysis of their performance.

## Prerequisites by Topic:

1. Basic concepts of characterization of signals and linear and nonlinear systems.
2. Basic circuit analysis concepts and procedures.
3. Basic concepts of probability and statistics.
4. Basic concepts of Boolean arithmetic.

## Topics Covered/Class Schedule/Evaluation:

1. Review of signals and systems: Signals; vectors; correlation; trigonometric and exponential Fourier series; Fourier transform.
2. Signal transmission: Filters; distortion; signal energy; energy spectral density; signal power; power spectral density.
3. Amplitude modulation ("linear") modulation: Baseband and carrier communication; double sideband-suppressed carrier (DSB-SC); double sideband with carrier (DSB-C); quadrature amplitude modulation (QAM); single sideband (SSB); vestigial sideband (VSB); carrier acquisition; superheterodyne receiver; television.
4. Angle modulation: Instantaneous frequency; bandwidth of angle-modulated waves; frequency modulation (FM) and phase modulation (PM) generation; FM and PM demodulation and receivers; interference.
5. Sampling and pulse code modulation: Sampling theorem; quantization; analog-to-digital converters; pulse-code modulation (PCM); differential PCM; delta modulation.
6. Digital data transmission: Digital communication system; line coding; pulse shaping; scrambling; regenerative repeater; detection-error probability; M-ary communication; digital carrier systems; digital multiplexing.

## Course Outline:

<i>Week</i>	<i>Topic</i>	<i>Text Pages</i>	<i>Homework (H), Exam (E)</i>
1	Introduction: Signals. Vectors. Correlation.	1 – 40	H
2	Trigonometric and exponential Fourier series.	40 – 71	H
3	Fourier transform. Signal transmission.	71 – 106	H, E1 (50 points)

4	Filters. Distortion. Signal energy. Energy spectral density.	106 – 123	H
5	Signal power. Power spectral density.	123 – 150	H, E2 (50 points)
6	Amplitude modulation. DSB-SC. DSB-C.	151 – 170	H
7	QAM. SSB. VSB. Superheterodyning. Television.	170 – 207	H
8	Angle modulation. Instantaneous frequency. Bandwidth.	208 – 232	H
9	FM/PM generation and demodulation. Interference. Receiver.	233 – 250	H
10	Review for Exam 3		E3 (100 points)
11	Sampling theorem. Pulse code modulation (PCM).	251 – 278	H
12	Differential pulse code modulation. Delta modulation.	278 – 297	H
13	Line coding. Pulse shaping. Scrambling.	297 – 322	H
14	Repeater. Detection-error probability. M-ary communication.	322 – 336	H
15	Digital carrier systems. Digital multiplexing. Review.	231 – 249	H
16	Exam 4		E4 (100 points)

### Evaluation

Four examinations (including the "Final") - 300 pts.

(Note: Examinations are "open book" problems similar to those on handed out sample tests. Exam 3 on analog communication and Exam 4 on digital communication include both analysis and design components.)

Graded homework assignments - 30 pts.

(Note: Due dates for homework are specified.)

### Contribution of Course to Meeting the Professional Component:

- Quantitative tools for description and analysis of signals and systems; transmission of signals; analog and digital modulation and demodulation techniques; performance measurement.
- Design at the block diagram level of analog and digital communication systems, including waveform shaping, filtering, line coding, encoders/decoders, modulators/demodulators.
- Science and Design Content Distribution: Science – 2 units or 67%; Design – 1 unit or 33%.

### Relationship of Course to Program Outcomes:

- #3. Problem solving: In this course, students learn to use trigonometry, calculus, and time-domain/frequency-domain transform techniques to analyze and design communication systems.
- #4. Knowledge of core E&EE topics: This course provides students with a comprehensive overview of the core E&EE topic of communications.
- #6. Knowledge of probability, statistics and applications: In this course, students learn to apply probability and statistics to analyze error and signal-to-noise ratio performance of communications systems.
- #14. Life-long learning: This course shows students the great variety and on-going evolution of communication systems and their applications, and thus the need for life-long learning in this field. The course gives the students the foundation they need for life-long learning in this field.

Course Coordinator: Warren D. Smith, EEE

Date: November 10, 2008

# EEE 185 MODERN COMMUNICATION SYSTEMS

## Required Course

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## Course Objectives:

1. Provide the student with an overview of currently used analog and digital communication methods and their relative advantages and disadvantages.
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Course Coordinator: Warren D. Smith, EEE

Date: May 24, 2007