Code #EN19 (2014) Rev 041015

**New/Special Course Proposal-Bulletin Change Transmittal Form**

X **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.

**Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to [mmcginnis@astate.edu](mailto:mmcginnis@astate.edu)

|  |
| --- |
| X **New Course or** ☐**Special Course (Check one box)**  *Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.* |

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date… **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date…  **COPE Chair (if applicable)** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date… **Department Chair:** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date…  **General Education Committee Chair (If applicable)** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date… **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date…  **Undergraduate Curriculum Council Chair** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date… **College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date…  **Graduate Curriculum Committee Chair** |
|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enter date…  **Vice Chancellor for Academic Affairs** |

1.Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)

EE 4743

2.Course Title – if title is more than 30 characters (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).

Digital Communications

3.Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.

Lecture only

4.What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?

Standard Letter

5.Is this course dual listed (undergraduate/graduate)?

Yes

6.Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)

No

7.Brief course description (40 words or fewer) as it should appear in the bulletin.

Continuation of communications theory with emphasis on modulation and demodulation techniques, signal space representation of digitally modulated signals, coherent/non-coherent detection methods (and receiver structures) in AWGN channel, error performance, communication over band-limited channels with ISI and AWGN.

8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, the student will not be allowed to register).

a. Are there any prerequisites?

Yes, EE 3393 Probability and Random Signals, EE 4333 Communications Theory.

b. Why?

This course involves the analog signal to be converted, coded/decoded, transmitted, and received over specific digital media. Students need basic understanding of communication theory, and also understand random and periodic signals. This understanding necessitates the prerequisites listed.

9.Course frequency(e.g. Fall, Spring, Summer). Not applicable to Graduate courses.

Spring 2017, odd

10.Contact Person (Name, Email Address, Phone Number)

Tanay Bhatt, Ph.D., [tbhatt@astate.edu](mailto:tbhatt@astate.edu), 870-680-8453

Shubhalaxmi Kher, [skher@astate.edu](mailto:skher@astate.edu), 870-972-2088

11.Proposed Starting Term/Year

Fall 2015

12.Is this course in support of a new program? No

If yes, what program?

Enter text...

13.Does this course replace a course being deleted? No

If yes, what course?

Enter text...

Has this course number been used in the past? No

*Submit Course Deletion Proposal-Bulletin Change Transmittal Form.*

14.Does this course affect another program? No

If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.

Enter text...

15.Justification should include:

a.Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)

The students will be able to characterize, analyze, and design modulators and demodulators. They will also be able to evaluate error rate performance of a digital signal and design a digital communication system.

b.How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.

During the ABET accredited BSEE program discussions and review meeting, the need to modernize the curriculum including courses in communication systems was confirmed. The faculty along with the advisory council agreed that a course covering digital communications would best meet the needs of the program graduates.

c.Student population served.

EE Majors

d.Rationale for the level of the course (lower, upper, or graduate).

This upper level undergraduate elective course builds upon various introductory concepts presented in courses such as, EE 3373 Probability and Random Signals and EE 4333 Communications Theory.

16.Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)

Weeks Topic

1 Introduction, review of probability, signals and spectra

2 Binary and M-ary PCM

3 Differential PCM, Delta modulation, Adaptive Delta modulation, Line codes

4 Signal space concept

5 Baseband digital modulation

6 Baseband demodulation and detection

7 Error probability evaluation

8 Bandpass modulation (PAM, PSK, FSK, QAM, OQPSK, pi/4 shifted QPSK)

9 Differential modulation/demodulation, Non-coherent detection, Error probability

10 Signal designs for bandlimited channels

11 Comparison of modulation types, Bandwidth efficiency, Channel capacity

12-13 Link budget

14 Channel coding and Source coding

17.Course requirements (e.g. research papers, projects, interviews, tests, etc.)

Papers and projects.

18.Special features (e.g. labs, exhibits, site visitations, etc.)

N/A

19.Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)

No

20. What is the primary intended learning goal for students enrolled in this course?

Demonstrate understanding of the digital communication mechanisms and design and study the performance of Digital Communication Systems.

21.Reading and writing requirements:

a.Name of book, author, edition, company and year

John G. Proakis and Masoud Salehi, Digital Communications, McGraw- Hill, 2008. ISBN 978-0-07-295716-7

b.Number of pages of reading required per week: 10-12

c.Number of pages of writing required over the course of the semester: N/A

22.High-Impact Activities (Check all that apply)

☐Collaborative assignments

xResearch with a faculty member

☐Diversity/Global learning experience

☐Service learning or community learning

☐Study abroad

☐Internship

xCapstone or senior culminating experience

☐Other Explain: Enter text...

23.Considering the indicated primary goal (in Box #20), provide up to three outcomes that you expect of students after completion of this course.

**Outcome #1:** (For example, what will students who meet this goal know or be able to do as a result of this course?)

Student will develop good understanding of time domain and frequency domain transforms and apply this knowledge in engineering practice.

Learning Activity:(For example, what instructional processes do you plan to use to help students reach this outcome?)

Lecture, homework.

Assessment Tool: (For example, what will students demonstrate, represent, or produce to provide evidence of their learning?)

Students will demonstrate the relational aspects of discrete time systems based on their continuous time equivalents, proficiency of signal processing, and error performance evaluation using tools like MATLAB through a design project.

Student performance will be evaluated with a rubric for compliance with the design specifications.

*(Repeat if needed for additional outcomes 2 and 3)*

**Outcome #2:**

Learning Activity:

Assessment Tool:

**Outcome #3**:

Learning Activity:

Assessment Tool:

24.Please indicate the extent to which this course addresses university-level student learning outcomes:

* 1. Global Awareness

xMinimally  
☐Indirectly  
⎕Directly

* 1. Thinking Critically

☐Minimally  
☐Indirectly  
xDirectly

* 1. Using Technology

☐Minimally  
☐Indirectly  
xDirectly

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**To copy from the bulletin:**

1. Minimize this form.
2. Go to <http://registrar.astate.edu/bulletin.htm> and choose either undergraduate or graduate.
3. This will take you to a list of the bulletins by year, please open the most current bulletin.
4. Find the page(s) you wish to copy, click on the “select” button and highlight the pages you want to copy.
5. Right-click on the highlighted area.
6. Click on “copy”.
7. Minimize the bulletin and maximize this page.
8. Right-click immediately below this area and choose “paste”.
9. For additions to the bulletin, please change font color and make the font size larger than the surrounding text. Make it noticeable.
10. For deletions, strike through the text, change the font color, and enlarge the font size. Make it noticeable.

**Add course descriptions to page 444 in the catalog after EE 4383 Digital Electronics II and before EE 4773 Intermediate Electrical Engineering Laboratory**

Page 445, 2015-15 Undergraduate Bulletin

**EE 4383. Digital Electronics II** Continuation of the study of digital circuit design with emphasis on the design of larger systems and use of LSI components. Register transfer logic, computer interfacing and design, and microcomputer based system design. Prerequisite, C or better in EE 3333. Demand. Dual listed as EE 5383.

**EE 4743 Digital Communications** Continuation of communications theory with emphasis on modulation and demodulation techniques, signal space representation of digitally modulated signals, coherent/non-coherent detection methods (and receiver structures) in AWGN channel, error performance, communication over band-limited channels with ISI and AWGN. Prerequisites, C or better in EE 3393 and EE 4333. Spring, odd.

**EE 4773. Intermediate Electrical Engineering Laboratory** Advanced design-oriented experiments in electronics, measurement, interfacing, and other electrical engineering topics. Corequisite, EE 4373. Prerequisites, C or better in EE 3333, and EE 3401. Spring.