Code #EN17 (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

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| --- |
| 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 4343

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 Signal Processing

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

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.

Analysis and design of discrete linear systems and processing of digital signals. Topics include: time and frequency domain approaches to discrete signals and systems, discrete Fourier transform and its computation, and design of digital filters.

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 3353 Signals and Systems, EE 3403 Electronics I, and EE 3333 Digital Electronics I.

b. Why?

 This upper level course builds on the concepts learned in EE 3353 Signals and Systems, EE 3403 Electronics I, and EE 3333 Digital Electronics I. It involves acquiring and processing discrete and continuous time signals using digital systems.

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

Spring 2016

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

Tanay Bhatt, Ph.D., tbhatt@astate.edu, 870-680-8453

Shubhalaxmi Kher, Ph.D, 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)

This course aims to provide introduction to the analysis and design of discrete linear systems and processing of digital signals. Topics include; time and frequency domain approaches to discrete signals and systems, discrete Fourier transform and its computation, and design of digital filters.

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.

Faculty and student discussions during the BSEE program review meetings have led to a modernization of the curriculum with an emphasis on courses related to communications. The faculty along with the advisory council agreed that a modern course covering signal processing aspects in the digital domain would best meet the needs of the program.

c. Student population served.

EE Majors

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

This upper level course builds on the foundations of all the basic electronics courses namely; EE 3353 Signals and Systems, EE 3403 Electronics I, and EE 3333 Digital Electronics I which are junior level.

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.)

 Week Topic

1-3 Discrete Time Signals and Systems (Chapters 1, 2, 6.1)

4-5 Z -Transforms and Analysis of Linear Time Invariant Systems (Chapter 3)

6-9 Frequency Analysis of Discrete Time Signals and LTI Systems (Chapters 4 & 5)

10-12 Design of Digital FIR and IIR Filters (Selected material from Chapter 5 & Chapter 10: 10.2, 10.3)

13-14 Discrete Fourier Transform (Chapter 7)

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 frequency scale relationship between continuous time (CT) and

discrete time (DT) signals along with an understanding of the design and performance of IIR and FIR filters.

21.Reading and writing requirements:

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

Digital Signal Processing, by John G. Proakis and Dimitris G. Manolakis, Fourth Edition, Prentice Hall, 2007. ISBN: 0-13-187374-1

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

c.Number of pages of writing required over the course of the semester: NA

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?)

Students will understand the frequency scale relationship between continuous time (CT)and discrete time (DT) signals and how these signals are processed.

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

Students will learn and analyze signals with signal processing mechanisms and their performance issues using student projects.

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 continuous time equivalents as a project component which will be evaluated.

*(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

X Minimally
☐Indirectly
☐Directly

* 1. Thinking Critically

☐Minimally
☐Indirectly
x Directly

* 1. Using Technology

☐Minimally
☐Indirectly
x Directly

**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 EE 4343 course descriptions to page 444 after EE 4333 Communications Theory and before EE 4344 Microprocessor and PLC Applications. Note that bulletin currently has some courses out of numerical order which should also be corrected.

Page 444, 2014-15 Undergraduate Bulletin

**EE 4313. Control Systems** Analysis and design of linear feedback systems. Transfer func­tions, transient and steady state characterization, stability determination. Closed loop analysis and design using root locus and frequency domain methods. Prerequisites, C or better in EE 3403. Corequisite, EE 3353. Dual listed as EE 5313. Demand.

**EE 4333. Communications Theory** Frequency spectra of time signals. Review of Fourier series and transforms. Signal mixing, modulation, and demodulation. AM and FM broadcasting techniques and bands. Pulsed and digital communication modes. Prerequisite, C or better in EE 3353 and EE 3403. Dual listed as EE 5333. Demand.

**EE 4321. Electrical Machinery Laboratory** Experiments dealing with motor, generators, transformers, and associated measurements and controls. Prerequisite, C or better in ENGR 2421. Corequisite, EE 4323. Demand.

**EE 4323. Electrical Machinery** Introduction to the analysis and design of electromechanical energy conversion systems, magnetic circuit theory, general transformer and machinery theory, and DC and AC motors and generators. Prerequisite, C or better in EE 3313 or ENGR 3473, and ENGR 3423. Dual listed as EE 5323. Demand.

**EE 4343 Digital Signal Processing** Analysis and design of discrete linear systems and processing of digital signals. Topics include: time and frequency domain approaches to discrete signals and systems, discrete Fourier transform and its computation, and design of digital filters. Prerequisites, C or better in EE 3353, EE 3403, and EE 3333. Spring.

**EE 4344. Microprocessor and PLC Applications** A microcomputer and programmable logic controller course for junior and senior level engineers. A survey of small computers and their engineering functions including control, sensing, and computation. The concept of using control programming languages is introduced. Prerequisites, C or better in EE 3333 and EE 3401, or consent of instructor. Dual listed as EE 5344. Demand.