PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(100-400 LEVEL)

DEPARTMENT: Motorsports Engineering
EFFECTIVE SESSION: Fall 2009

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: MSTE
Course Number: 340
Long Title: Dynamic Systems and Signals

EXISTING:

Subject Abbreviation: 
Course Number: 
Long Title: Dyn Sys and Signals

TERMS OFFERED

Check All That Apply:
- Summer
- Fall
- Spring

CAMPUS(ES) INVOLVED

- Calumet
- Cont Ed
- Ft. Wayne
- N. Central
- Tech Statewide
- W. Lafayette
- Indianapolis

CREDIT TYPE

1. Fixed Credit: Cr. Hrs.
2. Variable Credit Range: [ ]
   Minimum Cr. Hrs: [ ]
   Maximum Cr. Hrs: [ ]
   (Check One) To [ ] Or [ ]
3. Equivalent Credit: Yes [ ] No [ ]
4. Thesis Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply

1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Credit by Examination
5. Designator Required
6. Special Fees
7. Registration Approval Type
   Department [ ] Instructor [ ]
8. Variable Title
9. Remedial
10. Honors
11. Full Time Privilege
12. Off Campus Experience

INSTRUCTIONAL TYPE

- Lecture
- Recitation
- Presentation
- Laboratory
- Lab Prep
- Studio
- Distance
- Clinic
- Experiential
- Research
- Ind. Study
- Pract/Observe

- Minutes Per Mtg: 75
- Meetings Per Week: 2
- Weeks Offered: 15
- % of Credit Allocated
- Delivery Method
- Delivery Medium (Audio, Internet, Live, Text-Based, Video)
- Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES):

P: MSTE 210 and MATH 268 or permission of instructor. This course studies measurement, modeling and formulation of solutions for dynamic systems, both digital and analog, including response and calibration data gathering systems.

Calumet Department Head: [Signature] Date: 2/19/09
Calumet School Dean: [Signature] Date: 3-17-09

Ft. Wayne Department Head: [Signature] Date: 
Ft. Wayne School Dean: [Signature] Date: 

Indianapolis Department Head: [Signature] Date: 
Indianapolis School Dean: [Signature] Date: 

North Central Department Head: [Signature] Date: 
North Central Chancellor: [Signature] Date: 

West Lafayette Department Head: [Signature] Date: 
West Lafayette College/School Dean: [Signature] Date: 
West Lafayette Registrar: [Signature] Date: 

OFFICE OF THE REGISTRAR
New Course Request

Indiana University

Check Appropriate Boxes: Undergraduate credit [ ] Graduate credit [ ] Professional credit [ ]

1. School/Division: School of Engineering & Technology
2. Academic Subject Code: MSTE

3. Course Number: 340 (must be cleared with University Enrollment Services)
4. Instructor: Pete Hylton

5. Course Title: Dynamic Systems and Signals

Recommended Abbreviation (Optional): (Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): Fall 2009

7. Credit Hours: Fixed at: [ ] 3 or Variable from _______ to _______

8. Is this course to be graded S-F (only)? Yes [X] No [ ]

9. Is variable title approval being requested? Yes [ ] No [X]

10. Course description (not to exceed 50 words) for Bulletin publication:

P. MSTE 210 and MATH 266 or permission of instructor. This course studies measurement, modeling and formulation of solutions for dynamic systems, both digital and analog, including response and calibration data gathering systems.

11. Lecture Contact Hours: Fixed at: [ ] 3 or Variable from _______ to _______

12. Non-Lecture Contact Hours: Fixed at: [ ] _______ or Variable from _______ to _______

13. Estimated enrollment: [ ] _______ of which [ ] _______ percent are expected to be graduate students.

14. Frequency of scheduling: [ ] yearly. Will this course be required for majors? [X]

15. Justification for new course: [ ] Part of the already approved BS in Motorsports Engineering

16. Are the necessary reading materials currently available in the appropriate library? [X]

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Sponsored by:

Date: 2/17/09

Dean of Graduate School (when required)

Approved by:

Date: 3-17-09

Chancellor/Vice-President

University Enrollment Services

After School Division approval, forward the last copy (without attachments) to University Enrollment Services for final processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UFS 724
MSTE 340 - DYNAMIC SYSTEMS AND SIGNALS (co-listed with ME340)

Course Objectives: Introduction to dynamic engineering systems and continuous-time and discrete-time signals; electrical, mechanical, electromechanical components; linear system response; Fourier series and Laplace transform. This course is designed to teach students the basic concept for modeling the behavior of dynamic systems. The development of a mathematical modeling for an engineering system is treated. Basic solution techniques for solving these problems and the interpretation of system behavior are discussed. State-space methods will be emphasized by studying continuous-time and discrete-time signals and systems.

Textbook:
2. TBD

Reference:
TBD

Pre-requisites: The pre-requisite for this course are EE 204, MATH 262. Students who have not met this requirement should see the Instructor immediately.

Course Outline

1. Introduction to Modeling and Dynamic Systems
2. Signals and Sequences
3. Laplace transforms
4. Fourier series and Fourier transform
5. Eigenvalues & eigenvectors of simple matrices. Use of MATLAB.
6. Dynamic system elements
   a) Mechanical
   b) Electrical
   c) Electromechanical
7. Continuous State-Space Systems
8. Transient response of linear systems
9 Frequency Response
10 Discrete-Time Systems
11 Z-Transform
12 Discrete State-Space Systems
13 Discrete Fourier Transform (3 classes)

Outcomes:

*After completion of this course, the students should be able to:*

1. Explain the concept of a system, as well as the inputs and outputs of a system [a4]

2. Identify the difference between single and multiple inputs and outputs, in particular, the acronyms: SISO, MIMO, etc. [a4]

3. Formulate the governing differential equations for simple mechanical systems governed by Newton's laws of motion and Hooke's law [e]

4. Formulate differential equations for simple electrical circuits using Kirchhoff's and Ohm's laws [e]

5. Determine the Laplace, z-, and Fourier transforms of continuous and discrete signals and systems. Determine the state transition matrices for linear dynamic systems to study the dynamic responses. [a]

6. Determine the conditions under which stability of systems and convergence of signals occur (in both continuous-time and discrete-time). [b1, b2]

7. Determine state-space models for continuous and discrete systems. [a]

8. Obtain the eigenvalues and eigenvectors of simple matrices with real elements using MATLAB [k4]

9. Obtain the frequency response of first and second order systems using MATLAB [k4]

10. Simulate linear and nonlinear dynamic systems using MATLAB, and present the results in the time domain, or the frequency domain, or the phase space [k4]
11 Determine and apply the appropriate methods and techniques to study transient responses and stability after determining the nature of the signals and systems. [a]