PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

DEPARTMENT ENGINEERING
EFFECTIVE SESSION FALL 2009

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

- New course with supporting documents
- Add existing course offered at another campus
- Expiration of a course
- Change in course number
- Change in course title
- Change in course credit/ype
- Change in course attributes (department head signature only)
- Change in instructional hours
- Change in course description
- Change in course requisites
- Change in semesters offered (department head signature only)
- Transfer from one department to another

PROPOSED:

<table>
<thead>
<tr>
<th>Subject Abbreviation</th>
<th>ECE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>333</td>
</tr>
<tr>
<td>Long Title</td>
<td>AUTOMATIC CONTROL SYSTEMS</td>
</tr>
<tr>
<td>Short Title</td>
<td>AUTOMATIC CONTROL SYSTEMS</td>
</tr>
</tbody>
</table>

Abbreviated title will be entered by the Office of the Registrar if omitted. (20 CHARACTERS ONLY)

CREDIT TYPE

1. Fixed Credit: Cr. Hrs.
   - [ ] 3

2. Variable Credit Range:
   - Minimum Cr. Hrs
   - (Check One) To [ ] Or [ ]
   - Maximum Cr. Hrs
   - Equivalent Credit: [ ] Yes [ ] No

Schedule Type

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Recitation</th>
<th>Presentation</th>
<th>Laboratory</th>
<th>Lab Prep</th>
<th>Studio</th>
<th>Distance</th>
<th>Clinic</th>
<th>Experiential</th>
<th>Research</th>
<th>Ind. Study</th>
<th>Pract/Observ</th>
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</thead>
<tbody>
<tr>
<td>50 Min</td>
<td>3 Min</td>
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<td>15</td>
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</tbody>
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% of Credit Allocated

COURSE ATTRIBUTES: Check All That Apply

1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Credit by Examination
5. Special Fees
6. Registration Approval Type
   - [ ] Department
   - [ ] Instructor

Cross-Listed Courses

- ME 333

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

P: ECE 304, ME 253
Cr. 3

Analysis and design of control systems, from modeling and computer solutions to stability and performance issues with an orientation toward electrical and mechanical systems. Classical control system concepts are emphasized but an introduction to modern techniques is also provided.

Calumet Department Head
Date

Calumet School Dean
Date

Donald Muller
2/24/09

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 333 AUTOMATIC CONTROL SYSTEMS

Credit Hours: 3

Course Description:
Analysis and design of control systems, from modeling and computer solutions to stability and performance issues with an orientation toward electrical and mechanical systems. Classical control system concepts are emphasized but an introduction to modern techniques is also provided.

Prerequisite:
ECE301 and ME253

Prerequisite by Topic:
Calculus, ordinary differential equations, Laplace Transforms, elementary complex variables, elementary linear algebra, and elementary dynamics

Offering: Fall and Spring.

Textbook:
* Professor of Electrical Engineering
** Professor of Aerospace Engineering and Engineering Mechanics

Course Objectives:
This is an introductory course in control systems. The aim is to provide both ME and EE students with the background needed to model and design automatic control systems for electrical, mechanical, and electromechanical systems using the classical concepts of root locus, Bode plots, and Nyquist diagrams, and to assess the stability and performance of such systems. An introduction to the state space techniques is also provided. Matlab and Simulink are used as the primary computer aided design tools for control systems. Multidisciplinary team projects will be assigned.

Topics To be Covered:
1. Signals, systems, and response
2. Laplace transform and partial fraction expansion
3. Block diagrams and signal flow graphs
4. Stability and Routh-Hurwitz criterion
5. Modeling electrical and mechanical systems
6. Modeling electromechanical systems
7. Time-domain specifications, performance measures, simulations
8. State space modeling and response
9. Steady-state error and internal model principle
10. Sensitivity in feedback systems
11. Disturbance attenuation
12. Root locus analysis and design
13. Bode analysis and design
14. Nyquist analysis
15. Nichols chart analysis and design
16. Stability and Lyapunov functions
17. Controllability and observability
18. Properties of state feedback and state feedback design

Prepared by Hossein Oloomi (EE) and Bongsu Kang (ME), January 2009.