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| For Academic Affairs and Research Use Only |
| Proposal Number | ECS20 |
| CIP Code:  |  |
| Degree Code: |  |

**New or Modified Course Proposal Form**

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

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| **[ ]New Course, [ ]Experimental Course (1-time offering), or [X]Modified Course (Check one box)** |

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

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| --- | --- |
| Ilwoo Seok 3/16/2022**Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**COPE Chair (if applicable)** |
| Shivan Haran 3/16/2022**Department Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Head of Unit (if applicable)**   |
| Jason Stewart 3/23/2022**College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Undergraduate Curriculum Council Chair** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Director of Assessment (new courses only)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Graduate Curriculum Committee Chair** |
| Abhijit Bhattacharyya 3/25/2022**College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Vice Chancellor for Academic Affairs** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**General Education Committee Chair (if applicable)**   |  |

1. **Contact Person (Name, Email Address, Phone Number)**

**Shivan Haran; sharan@astate.edu; (870) 972-3413**

1. **Proposed starting term and Bulletin year for new course or modification to take effect**

**Fall 2022; 2022-23 Bulletin**

**Instructions:**

*Please complete all sections unless otherwise noted. For course modifications, sections with a “Modification requested?” prompt need not be completed if the answer is “No.”*

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|  | **Current (Course Modifications Only)** | **Proposed (New or Modified)** *(Indicate “N/A” if no modification)* |
| **Prefix** | **ME** | **N/A** |
| **Number\*** | **3613** | **4603** |
| **Title** (include a short title that’s 30 characters or fewer) | **Control Systems for Mechanical Engineering** | **N/A** |
| **Description\*\*** | **Analytical tools and principles for control design for mechanical systems including time and frequency domain techniques, analysis of response, design parameters, types of control systems, PLCs, relationship between transferfunction methods and state-space methods.** | **N/A** |

 ***\**** Confirm with the Registrar’s Office that number chosen has not been used before and is available for use. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*.

\*\*Forty words or fewer (excepting prerequisites and other restrictions) as it should appear in the Bulletin.

1. **Proposed prerequisites and major restrictions** **[Modification requested? No]**

(Indicate all prerequisites. 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).

1. Are there any prerequisites?
	1. If yes, which ones?

Enter text...

* 1. Why or why not?
1. Is this course restricted to a specific major?
	1. If yes, which major? Enter text...
2. **Proposed course frequency [Modification requested? No]**

(e.g. Fall, Spring, Summer; if irregularly offered, please indicate, “irregular.”) *Not applicable to Graduate courses.*

1. **Proposed course type [Modification requested? No]**

Will this course be lecture only, lab only, lecture and lab, activity (e.g., physical education), dissertation/thesis, capstone, independent study, internship/practicum, seminar, special topics, or studio? Please choose one.

1. **Proposed grade type [Modification requested? No]**

What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental, or other [please elaborate])

1. **No** Is this course dual-listed (undergraduate/graduate)?
2. **No** Is this course cross-listed?

*(If it is, all course entries must be identical including course descriptions. Submit appropriate documentation for requested changes. It is important to check the course description of an existing course when adding a new cross-listed course.)*

**a.** – If yes, please list the prefix and course number of the cross-listed course.

 Enter text...

 **b.** – **Yes / No** Can the cross-listed course be used to satisfy the prerequisite or degree requirements this course satisfies?

 Enter text...

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

a. If yes, what program?

 Enter text...

1. **No** Will this course be a one-to-one equivalent to a deleted course or previous version of this course (please check with the Registrar if unsure)?

a. If yes, which course?

Enter text...

**Course Details**

1. **Proposed outline** **[Modification requested? No]**

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

1. **Proposed special features** **[Modification requested? No]**

1. **Department staffing and classroom/lab resources**

Class can be offered as part of the existing faculty teaching load; sufficient classroom space is available.

1. Will this require additional faculty, supplies, etc.?

 **No**

1. **No** Does this course require course fees?

 *If yes: please attach the New Program Tuition and Fees form, which is available from the UCC website.*

**Justification**

**Modification Justification (Course Modifications Only)**

1. Justification for Modification(s)

This course is a Senior level course offered in the 4th year of the BSME degree program. The earlier course number did not reflect this and hence the request for change to a 4000-level course. As seniors taking this course, the students will be better prepared as well as have an improved understanding of the course material, in addition to being able to do the lab exercises.

**New Course Justification (New Courses Only)**

1. Justification for course. Must include:
2. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)
3. How does the course fit with the mission of the department? If course is mandated by an accrediting or certifying agency, include the directive.
4. Student population served.

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

**Assessment**

**Assessment Plan Modifications (Course Modifications Only)**

1. **No** Do the proposed modifications result in a change to the assessment plan?

 *If yes, please complete the Assessment section of the proposal*

**Relationship with Current Program-Level Assessment Process (Course modifications skip this section unless the answer to #18 is “Yes”)**

1. What is/are the intended program-level learning outcome/s for students enrolled in this course? Where will this course fit into an already existing program assessment process?

1. Considering the indicated program-level learning outcome/s (from question #19), please fill out the following table to show how and where this course fits into the program’s continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

 *(Repeat if this new course will support additional program-level outcomes)*

 **Course-Level Outcomes**

1. What are the course-level outcomes for students enrolled in this course and the associated assessment measures?

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| **Outcome 1**  | Upon completion of the course, students would have learnt fundamental concepts in Controls, block diagrams, design of a feedback control system for a second-order vibrations model; PID controls and its applications |
| Which learning activities are responsible for this outcome? | In-class discussion and problem solving using mathematical modelingDemonstration of results and workings from the models and application to basic mechanical systems |
| Assessment Measure  | HW, Exams and quizzes |

*(Repeat if needed for additional outcomes)*

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| **Outcome 2**  | Upon completion of the course, students would have understood basics of control systems and their role in design for practical applications using PLCs and/or microcontrollers |
| Which learning activities are responsible for this outcome? | Design of an experiment for a mechanical system and use of PLC or microcontroller to program and demonstrate different control actions; use of ladder logic; Demonstration of the experiment; presentation of a final report |
| Assessment Measure | Project, lab report and demonstration |

**Bulletin Changes**

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| **Instructions**  |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Please include a before (with changed areas highlighted) and after of all affected sections.** **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.**  |

**Bulletin in Page 209**

***Before***

ME 2502, Solid Modeling for Mechanical Engineers 2
ME 3504, Process Monitoring and Control 4
ME 3513, Mechanical Vibrations 3
ME 3533, Engineering Thermodynamics II 3
ME 3613, Control Systems for Mechanical Engineers 3
ME 4503, Fluid and Thermal Energy Systems 3
ME 4543, Machine Design 3

***After***

ME 2502, Solid Modeling for Mechanical Engineers 2
ME 3504, Process Monitoring and Control 4
ME 3513, Mechanical Vibrations 3
ME 3533, Engineering Thermodynamics II 3
~~ME 3613, Control Systems for Mechanical Engineers 3~~
ME 4503, Fluid and Thermal Energy Systems 3
ME 4543, Machine Design 3

ME 4553, Heat Transfer 3

ME 4563, Introduction to Manufacturing Processes 3

ME 4573, Mechanical System Design 3

***ME 4603, Control Systems for Mechanical Engineers 3***

ME 4613, Introduction to Mechatronics 3

**Bulletin in Page 214**

***Before***

EE 4313, Control Systems Theory 3
MATH 3243, Linear Algebra 3
ME 3504, Process Monitoring and Control 4
ME 3613, Control Systems for Mechanical Engineering 3

***After***

EE 4313, Control Systems Theory 3
MATH 3243, Linear Algebra 3
ME 3504, Process Monitoring and Control 4

~~ME 3613, Control Systems for Mechanical Engineering 3~~

***ME 4603, Control Systems for Mechanical Engineering 3***

**Bulletin in Page 502**

***Before***

**EE 4303. Electromagnetic Waves** Study of time harmonic electromagnetic wave interaction with materials including energy and momentum, polarization, reflection, refraction, wave-guides, radiation, and scattering. Prerequisites, C or better in EE 3343 or PHYS 2044, and C or better in MATH 4403. Dual listed as EE 5303. Spring, odd.

 **EE 4313. Control Systems Theory** 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 and Corequisite, EE 3353) OR a C or better in ME 3613. Dual listed as EE 5313. Fall.

 **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. Dual listed as EE 5323. Spring, even.

***After***

**EE 4303. Electromagnetic Waves** Study of time harmonic electromagnetic wave interaction with materials including energy and momentum, polarization, reflection, refraction, wave-guides, radiation, and scattering. Prerequisites, C or better in EE 3343 or PHYS 2044, and C or better in MATH 4403. Dual listed as EE 5303. Spring, odd.

 **EE 4313. Control Systems Theory** 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 and Corequisite, EE 3353) OR a C or better in ***ME 4603***. Dual listed as EE 5313. Fall.

 **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. Dual listed as EE 5323. Spring, even.

**Bulletin in Page 503**

***Before***

**EE 4353. Power Systems** Generation, transmission, and distribution of large scale electrical power, associated energy losses and practical design problems and complications. Transmission line analysis. Three phase power networks. Load monitoring and control. Prerequisite, C or better in EE 3313. Corequisite, MATH 4403. Dual listed as EE 5353. Fall.

 **EE 4354. Intelligent Control Systems** Introduction of fuzzy logic, fuzzy logic in control engineering, neural networks, Bayesian or belief networks, neuro-fuzzy systems, neuro-fuzzy controllers, controller design, and application problems. Prerequisite for EE majors, C or better in EE 4313; Prerequisite for ME majors, C or better in ME 3613. Dual listed as EE 5354. Spring, even.

 **EE 4373. Electronics II** A continuation of EE 3403 with emphasis on the analysis, simulation, and design of feedback, operational amplifier systems, frequency response, integrated circuits, and power and waveshaping circuits. Prerequisite, C or better in EE 3313, and EE 3403. Dual listed as EE 5373. Spring.

***After***

**EE 4353. Power Systems** Generation, transmission, and distribution of large scale electrical power, associated energy losses and practical design problems and complications. Transmission line analysis. Three phase power networks. Load monitoring and control. Prerequisite, C or better in EE 3313. Corequisite, MATH 4403. Dual listed as EE 5353. Fall.

 **EE 4354. Intelligent Control Systems** Introduction of fuzzy logic, fuzzy logic in control engineering, neural networks, Bayesian or belief networks, neuro-fuzzy systems, neuro-fuzzy controllers, controller design, and application problems. Prerequisite for EE majors, C or better in EE 4313; Prerequisite for ME majors, C or better in ***ME 4603***. Dual listed as EE 5354. Spring, even.

 **EE 4373. Electronics II** A continuation of EE 3403 with emphasis on the analysis, simulation, and design of feedback, operational amplifier systems, frequency response, integrated circuits, and power and waveshaping circuits. Prerequisite, C or better in EE 3313, and EE 3403. Dual listed as EE 5373. Spring.

**Bulletin in Page 546**

***Before***

**ME 3523. Introduction to Robotics Laboratory** Design and building of a robot for an engineering application based on standard sensors, controllers, motors and other components, including selection, design, and assembly of various components and programming for successful functioning of the robot. Prerequisites, C or better in MATH 4403 and ENGR 3423. Fall.

**ME 3533. Engineering Thermodynamics II** Application of first and second law concepts to actual and ideal cycles and processes. Prerequisite, C or better in ENGR 3443 and CHEM 1023. Spring.

**ME 3613. Control Systems for Mechanical Engineering** Analytical tools and principles for control design for mechanical systems including time and frequency domain techniques, analysis of response, design parameters, types of control systems, PLCs, relationship between transfer function methods and state-space methods. Prerequisite, “C” or better in MATH 4403. Spring.

***After***

**ME 3523. Introduction to Robotics Laboratory** Design and building of a robot for an engineering application based on standard sensors, controllers, motors and other components, including selection, design, and assembly of various components and programming for successful functioning of the robot. Prerequisites, C or better in MATH 4403 and ENGR 3423. Fall.

**ME 3533. Engineering Thermodynamics II** Application of first and second law concepts to actual and ideal cycles and processes. Prerequisite, C or better in ENGR 3443 and CHEM 1023. Spring.

**~~ME 3613. Control Systems for Mechanical Engineering~~** ~~Analytical tools and principles for control design for mechanical systems including time and frequency domain techniques, analysis of response, design parameters, types of control systems, PLCs, relationship between transfer function methods and state-space methods. Prerequisite, “C” or better in MATH 4403. Spring.~~

**Bulletin in Page 547**

***Before***

**ME 4593. Design of Heating, Ventilating, and Air-Conditioning Systems** Design of HVAC systems to modify environmental conditions. Prerequisites, C or better in ME 3533 and ME 4553. Dual listed as ME 5593. Spring.

 **ME 4613. Introduction to Mechatronics** With an emphasis on modeling, the course focuses on the performance characteristics and application of microprocessors, analog and digital electronics, and modern mechatronic systems and intelligent manufacturing, particularly smart sensors, controllers, and actuators. Prerequisite, C or better in MATH 4403. Corequisite, ME 3504. Dual listed as ME 5613. Fall.

***After***

**ME 4593. Design of Heating, Ventilating, and Air-Conditioning Systems** Design of HVAC systems to modify environmental conditions. Prerequisites, C or better in ME 3533 and ME 4553. Dual listed as ME 5593. Spring.

***ME 4603. Control Systems for Mechanical Engineering*** *Analytical tools and principles for control design for mechanical systems including time and frequency domain techniques, analysis of response, design parameters, types of control systems, PLCs, relationship between transfer function methods and state-space methods. Prerequisite, “C” or better in MATH 4403. Spring.*

 **ME 4613. Introduction to Mechatronics** With an emphasis on modeling, the course focuses on the performance characteristics and application of microprocessors, analog and digital electronics, and modern mechatronic systems and intelligent manufacturing, particularly smart sensors, controllers, and actuators. Prerequisite, C or better in MATH 4403. Corequisite, ME 3504. Dual listed as ME 5613. Fall.