Code # Enter text…

**New Course Proposal Form**

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

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

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

Email completed proposals to curriculum@astate.edu for inclusion in curriculum committee agenda.

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| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 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…**General Education Committee Chair (If applicable)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Vice Chancellor for Academic Affairs** |

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

**Shivan Haran,** **sharan@astate.edu****, 972 2088**

2. Proposed Starting Term and Bulletin Year

**Fall 2017**

3. Proposed Course Prefix and Number (Confirm that number chosen has not been used before. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

**ME 3523**

4. 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).

**Introduction to Robotics Laboratory (Intro to Robotics Lab)**

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

D**esign and building of a robot for an engineering application based on standard sensors, controllers, motors and other components. Involves selection, design, and assembly of various components and programming for successful functioning of the robot.**

6. Prerequisites and major restrictions. (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? **Yes**
	1. If yes, which ones?

**C or better in ENGR 3423, Dynamics and MATH 4403, Differential Equations**

* 1. Why or why not?

 **ENGR 3423 provides a theoretical understanding of the dynamics of motion and forces; the course also requires a background in math up to Differential Equations (MATH 4403) for understanding some of the problems related to motion.**

1. Is this course restricted to a specific major? **No**
	1. If yes, which major? Enter text...

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

**Fall**

8. 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, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.

**Lecture and Lab**

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

**Standard Letter**

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

**No**

11. 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**

1. If yes, please list the prefix and course number of cross listed course.

 Enter text...

1. Are these courses offered for equivalent credit? Yes / No

 Please explain. Enter text...

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

a. If yes, what program?

 Enter text...

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

a. If yes, what course?

Enter text...

14. Will this course be equivalent to a deleted course? **No**

a. If yes, which course?

Enter text...

15. Has it been confirmed that this course number is available for use? **Yes**

 *If no: Contact Registrar’s Office for assistance.*

16. 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...

**Course Details**

17. 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 No. Topic**

**1 Introduction to Robotic Systems; Terminology used in Robotics**

**2 Statics & Dynamics Overview**

**3 Planar Kinematics of Motion in 2-D and 3-D motion; governing equations**

**4 Coordinate Transformations & Positioning in 3-D space**

**5 Robotic Arms; Robot Vision**

**6 Sensors - types, functioning, use in robotics**

**7 Controls fundamentals; Mathematical modeling**

**8 Feedback Control**

**9, 10 Microcontroller, PLC, and programming of controllers**

**11 Drive Systems; motors & gears**

**12 Actuators, Effectors and Locomotion**

**13 Motion Planning, Mapping and Navigation**

**14 Review**

**Project – will be an ongoing effort throughout the semester with weekly meetings with the Instructor. Project will include a final report and presentation including demonstration of the robots designed and built by the respective groups**

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

**The Lab will involve a design project which the students (working in groups) will complete by the end of the semester. A broad problem statement will be given (will be application-based), and the students will be required to research the topic, present design possibilities, and finalize a design after discussing the pros and cons. The students will then identify, specify and source the required components, fabricate (as required) and assemble, test and demonstrate the proper functioning of the robot they have designed.**

19. Department staffing and classroom/lab resources

**Will use existing faculty/classroom/lab resources**

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

 **No**

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

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

**Course Justification**

21. Justification for course being included in program. Must include:

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

 **Students will learn to apply basic theory to analyze problems dealing with dynamics of motion in two/three dimensions, system-level design, selection of components based on specifications, programming controllers, etc. Students will also understand the basics for designing and fabricating systems which will be useful when they deal with other upper level courses/labs/projects and in Senior Design. This course has been offered three times in the past as special problems course, with an overwhelmingly positive response. We have had over thirty students who have taken this course as an Elective and have graduated.**

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.

 **With the BSME degree program accredited by ABET at Arkansas State University, the need to update and include modern courses in the degree program was felt by the faculty and the students. This new course will provide exposure to various practical design aspects at the component and system level, as well as programming an intelligent system to carry out a given function(s) or action(s). Being application oriented, the course also introduces the students to problem solving based on an application.**

c. Student population served.

**Mechanical and Electrical Engineering undergraduate students**

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

**Upper: The subject is designed to be an elective course in the BSME program. The subject requires senior level mathematics prerequisite (MATH 4403) and serves as a basis for work in Senior Design and Control Systems.**

**Assessment**

**University Outcomes**

22. Please indicate the university-level student learning outcomes for which this new course will contribute. Check all that apply.

|  |  |  |
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| * 1. **[X]** Global Awareness
 | * 1. **[X]** Thinking Critically
 | * 1. **[X]** Information Literacy
 |

**Relationship with Current Program-Level Assessment Process**

23. 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?

**Contributes to Standards B, D and F of the ABET Accreditation Standards (Mechanical Engineering Program Outcomes 2, 4 and 6)**

24. Considering the indicated program-level learning outcome/s (from question #23), 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.*

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| **Program-Level Outcome 1 (from question #23)** | **An ability to design and conduct experiments, as well as to acquire, analyze, and interpret data (Standard B / ME Program Outcome 2)** |
| Assessment Measure | **Lab work/Final report** |
| Assessment Timetable | F**all semester, annually** |
| Who is responsible for assessing and reporting on the results? | **The Instructor will assess and report to the appropriate College Outcome Committee Chair** |
| **Program-Level Outcome 2 (from question #23)** | **An ability to identify, formulate, and solve engineering problems (Standard D / ME Program Outcome 4)** |
| Assessment Measure | **Final report** |
| Assessment Timetable | **Fall semester, annually** |
| Who is responsible for assessing and reporting on the results? | **The Instructor will assess and report to the appropriate College Outcome Committee Chair** |
| **Program-Level Outcome 3 (from question #23)** | **An ability to communicate effectively, both orally and in writing (Standard F / ME Program Outcome 6)** |
| Assessment Measure | **Oral Presentation/Final report** |
| Assessment Timetable | **Fall semester, annually** |
| Who is responsible for assessing and reporting on the results? | **The Instructor will assess and report to the appropriate College Outcome Committee Chair** |

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

 **Course-Level Outcomes**

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

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| --- | --- |
| **Outcome 1** | **Students will understand how to design a robot based on a given application, specifications and constraints** |
| Which learning activities are responsible for this outcome? | **Students will select, specify, design and fabricate the components/sub-systems required to complete the design. This will include appropriate mechanical/electrical hardware (such as a controller) and use of a suitable software platform** |
| Assessment Measure  | **Demonstration of the final functioning robot and a comprehensive report. The design will be assessed with rubric for compliance with given specifications** |

*(Repeat if needed for additional outcomes)*

**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. Follow the following guidelines for indicating necessary changes.** **\*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.** - Deleted courses/credit hours should be marked with a red strike-through (~~red strikethrough~~)- New credit hours and text changes should be listed in blue using enlarged font (blue using enlarged font). - Any new courses should be listed in blue bold italics using enlarged font (***blue bold italics using enlarged font***)*You can easily apply any of these changes by selecting the example text in the instructions above, double-clicking the ‘format painter’ icon 🡪 , and selecting the text you would like to apply the change to.* *Please visit* [*https://youtu.be/yjdL2n4lZm4*](https://youtu.be/yjdL2n4lZm4) *for more detailed instructions.* |

**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. Electronics II 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.

**EE 479V. Special Problems in Electrical Engineering** Individually directed problems in electrical engineering for juniors and seniors. A course outline and project summary listing the goals and expected outcomes must be approved by the student advisor and the program director. Prerequisites are dependent on the nature of the special problem. Demand.

**MECHANICAL ENGINEERING PROGRAM**

**Mechanical Engineering (ME)**

**ME 2502. Solid Modeling for Mechanical Engineers** An introduction to solid modeling and computer aided drafting, CAD, for mechanical engineers. Three dimensional models of mechanical components are virtually constructed using appropriate software tools. Fall, Spring.

**ME 3504. Process Monitoring and Control** Theory and application of instrumentation, mea­surement, and control of engineering systems. Prerequisites, C or better in MATH 4403, ENGR 2423 and ENGR 3443. Fall.

**ME 3513. Mechanical Vibrations** Kinematics of harmonic and nonharmonic vibrations, sys­tems of one and several degrees of freedom, free and forced vibrations, self excited vibrations. Prerequisites, C or better in MATH 4403 and ENGR 3423. Spring.

***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 3613. Control Systems for Mechanical Engineering** This course addresses the 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. Corequisite, ME 3513. Spring.

**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 4503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Prerequisites, C or better in ME 3533 and ME 4553. Dual listed as ME 5503. Fall.