# http://www.ric.edu/webcommunications/images/SealWithText_Small_Black.pngUNDERGRADUATE CURRICULUM COMMITTEE (UCC)PROPOSAL FORM

## Cover page scroll over blue text to see further important [instructions](#instructions): please read.

**N.B. DO NOT USE HIGHLIGHT, please DELETE THE WORDS THAT DO NOT APPLY TO YOUR PROPOSAL**

**ALL numbers in section (A) need to be completed, including the impact ones.**

|  |  |  |
| --- | --- | --- |
| A.1. [Course or program](#Proposal) | **TECH 306 Automation and Control Systems** |  |
| [Replacing](#Ifapplicable)  |  |
| A.2. [Proposal type](#type) | **Course: revision**  |
| A.3. [Originator](#Originator) | **Charles McLaughlin** | [Home department](#home_dept) | **Ed Studies/Technology Education** |
| A.4. [Context and Rationale](#Rationale)  | TECH 306 Automation and Control Systems will serve as a new Advanced Quantitative and Scientific Reasoning course for the General Education Program.This course is designed to introduce students to Automation and Control Systems.  It allows students to explore pneumatic power, CNC, and industrial control systems. Applications for controlling devices/and systems will be taught in a lab setting. Robotics programming and precision measurement systems experiences included.The study of automation and control systems will create awareness of the resources and their manipulation to create other efficient technological systems.  Activities related to automation and control systems: pneumatics, CNC, 3D printing, and laser cutting/etching will support appropriate problem solving and decision-making opportunities. The directed laboratory experiences emphasize the application of physical laws of science, data acquisition, and data analysis, giving participants an understanding of the basic principles of developing, using, and assessing technological systems. |
| A.5. [Student impact](#student_impact) | This AQSR course option provides students with opportunities to design with and produce artifacts using High Technology while developing technological literacy.This course will double as a program requirement and as an AQSR course; Technology Education and Applied Technology majors can take their General Education AQSR in the Technology Education Program. As an AQSR, this course also would be open to students in other departments, increasing their choices to work with new technology. |
| A.6. [Impact on other programs](#impact)  | May increase the numbers of other majors who use the Langevin Center and resources of the Technology Education Program. |
| A.7. [Resource impact](#Resource) | [*Faculty PT & FT*](#faculty):  | Minimal impact on Faculty load with 1 section as needed |
| [*Library*:](#library) | **NONE** |
| [*Technology*](#technology) | Ideal to have – But course can be offered without these 1 - VEX Classroom Robotics Kits (12 robots per kit) $39503 - REV FIRST GLOBAL Competition Robotics Kits @ $1,600/kitSoftware upgrades will be required from time-to-time. |
| [*Facilities*](#facilities): | **NONE** |
| A.8. [Semester effective](#Semester_effective) | **Fall 2019** | A.9. [Rationale if sooner than next Fall](#Semester_effective) |  |
| A.10. INSTRUCTIONS FOR CATALOG COPY: This single file copy must include ALL relevant pages from the college catalog, and show how the catalog will be revised. (1) Go to the “Forms and Information” page on the UCC website. Scroll down until you see the Word files for the current catalog. (2) Download ALL catalog sections relevant for this proposal, including course descriptions and/or other affected programs. (3) Place ALL relevant catalog copy into a single file. Put page breaks between sections and delete any catalog pages not relevant for this proposal. (4) Using the track changes function, revise the catalog pages to demonstrate what the information should look like in next year’s catalog. (5) Check the revised catalog pages against the proposal form, especially making sure that program totals are correct if adding/deleting course credits. If new copy, indicate where it should go in the catalog. If making related proposals a single catalog copy that includes all is acceptable. Send as a separate file along with this form. |

B. [NEW OR REVISED COURSES](#delete_if)  **DO NOT use highlight. Delete this whole page if the proposal does not include a new or revised course.**

|  | Old ([for revisions only](#Revisions))Only include information that is being revised, otherwise leave blank (delete provided examples that do not apply) | NewExamples are provided for guidance, delete the ones that do not apply |
| --- | --- | --- |
| B.1. [Course prefix and number](#cours_title)  | **TECH 306** | **TECH 306** |
| B.2. Cross listing number if any |  |  |
| B.3. [Course title](#title)  | **Automation and Control Processes** | **Automation and Control Systems** |
| B.4. [Course description](#description)  | An exploration of pneumatic, electric, and CNC industrial control and power systems. Applications for controlling devices/and systems will be taught in a lab setting. Robotics programming experiences included. | Students study automation and control systems to create efficient technological systems.  Activities include CNC, 3D printing, laser cutting/etching, and pneumatics to support appropriate technological problem solving and decision-making opportunities. |
| B.5. [Prerequisite(s)](#prereqs) | TECH 200 and TECH 202 | Completion of any mathematics or natural science general education distribution, or consent of department chair. |
| B.6. [Offered](#Offered) | **Fall | Spring**  | **Annually** |
| B.7. [Contact hours](#contacthours)  | **3** | **4** |
| B.8. [Credit hours](#credits) | **3** | **4** |
| B.9. [Justify differences if any](#differences) | The extra hour will be used for programming, and design processes in Lab |
| B.10. [Grading system](#grading)  | **Letter grade**  | **Letter grade**  |
| B.11. [Instructional methods](#instr_methods) | **Laboratory | Lecture**  | **Laboratory | Lecture | Seminar | Small group | Individual |** |
| B.12.[Categories](#required) | **Required for major | Required for Certification** | **Required for major | Free elective | Required for Certification** |
| B.13. Is this an Honors course? | **NO** | **NO** |
| B.14. [General Education](#ge)N.B. Connections must include at least 50% Standard Classroom instruction. | **NO |** | **YES** **category: AQSR** |
| B.15. [How will student performance be evaluated?](#performance) | **Attendance | Class participation | Exams | Presentations |****Class Work | Projects |**  | **Attendance | Class participation | Exams | Presentations | Papers |** **Class Work | Quizzes | Projects**  |
| B.16. [Redundancy statement](#competing) | **None** | **None** |
| B. 17. Other changes, if any |  |

| B.18**.** [**Course learning outcomes**](#outcomes)**: List each one in a separate row** | [**Professional Org.Standard(s)**](#standards)**, if relevant** | [**How will each outcome be measured**](#measured)**?** |
| --- | --- | --- |
| Gen Ed Requirements for ASQR | STL (Standards for Technological Literacy) |  |
| **Creative Thinking**Students will engage in activities that require them to perform hands on tasks. They will: 1) design, make, test and assess solutions for technological problems requiring the use of design software or programming software; 2) create programming for the development of products and systems for several automation systems;3) interpret and report on information related to technological design and innovation. | *Standard 8:* Students will develop an understanding of the attributes of design.*Standard 9:* Students will develop an understanding of engineering design.*Standard 19:* Students will develop an understanding of and be able to select and use manufacturing technologies. | **Assessment:*** Design Portfolio (Sketches, Final drawings)
* Prototype – CNC artifact, Pneumatic system, robotics programming, Design for 3D printed prototype.
* Individual and team presentations
* Class participation
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| **Quantitative Literacy**Students will demonstrate the ability to plan, design and develop prototypes and other solutions to technological problems that can be solved by appropriate mathematical methods using precision measurement equipment and design software. | *Standard 3:* Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.*Standard 19:* Students will develop an understanding of and be able to select and use manufacturing technologies. | **Assessment:*** Faro Precision Measurement arm activity;
* Planning and designing with design and programming software
* Prototyping – CNC artifact, Pneumatic system, robotics programming, Design for 3D printed prototype.
* Quizzes and Final Exam
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| **Scientific Literacy:**Students will use methods and processes of science such as observation, measuring, classifying, inferring, recording and analyzing data, communicating using a variety of means such as, writing, speaking, using graphs, tables, and charts, making calculations, and experimenting | *Standard 3*: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.*Standard 17*: Students will develop an understanding of and be able to select and use information and communication technologies*Standard 19:* Students will develop an understanding of and be able to select and use manufacturing technologies. | **Assessment:*** Materials selection and use paper
* Faro Precision Measurement arm activity;
* Pneumatics and robotics data sheets, etc.
* Planning and designing with design and programming software
* Prototyping – CNC artifact, Pneumatic system, robotics
* Quizzes and Final Exam
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| **Collaborative Work**Group work will be an essential part of this class. Students will work in collaborative groups to create solutions to scenarios posed in class. Additionally, student teams will present the results of their work to the other members of the class. The automation programming exercises for CNC, Robotics, and Laser cutting will be team oriented, so that students can work together to create solutions to the design challenges. | *Standard 6*: Students will develop an understanding of the role of society in the development and use of technology*Standard 13*: Students will develop the abilities to assess the impact of products and systems. | **Assessment:*** Design Portfolio (Sketches, Final drawings)
* Individual and team presentations
* Class participation
 |

| B.19. [**Topical outline**](#outline)**: Do NOT insert whole syllabus, we just need a two-tier outline**1. Introduction to Automation and Control Systems
* Measurement and Control
* Types of Control
* Historical significance of Automation and Control
* Applications for Automation and Control
* Methods for solving industrial processing problems
* Inputs/process/output processes for closed & open loop systems
1. Precision Measurement
	* Faro Arm - Introduction
	* Quality Control
	* Sensing (measurement)
	* Equipment control
	* Creating .STL from Scan
	* Feedback
2. Fluid Control Systems
	* Lab Safety
	* Principles of fluid power
	* Fluid power components
	* Pneumatics systems
	* Measuring fluid power
	* Characteristics of flow
	* Flow control
	* Hybrid Systems
	* Feedback Systems
3. Computer Controlled Systems
	* Lab Safety
	* CNC & Robotic systems
	* Computer systems & teach pendants
	* Principles of programming
	* Operation
	* Modeling
4. Additive Manufacturing Systems
	* Lab Safety
	* 3D Printing
	* Polyjet systems -
	* Fuse deposition modeling
	* Design and prototyping
	* CAD & CAM software programming
5. Subtractive Manufacturing Systems
	* Lab Safety
	* Laser Systems
	* Laser cutting & etching
	* Techniques – Vector and Raster
	* Components of Universal Laser
	* Intro to design software (CorelDraw)
	* Safety Steps
6. Robotic Systems
	* Evolution of Robotic systems
	* Types of Robotic systems
	* Classification of Robots
	* Robot parts
	* Degrees of Freedom
7. Robot Programming
	* Evolution of programming
	* Motion control
	* Programming methods
	* Program Language
8. Industrial Applications
	* Manufacturing processes
	* Work Cell
	* Work Environment
	* Vision systems

Maintenance |
| --- |

## D. Signatures

* Changes that affect General Education in any way MUST be approved by ALL Deans and COGE Chair.
* Changes that directly impact more than one department/program MUST have the signatures of all relevant department chairs, program directors, and relevant dean (e.g. when creating/revising a program using courses from other departments/programs). Check UCC manual 4.2 for further guidelines on whether the signatures need to be approval or acknowledgement.
* Proposals that do not have appropriate approval signatures will not be considered.
* Type in name of person signing and their position/affiliation.
* Send electronic files of this proposal and accompanying catalog copy to curriculum@ric.edu and a printed or electronic signature copy of this form to the current Chair of UCC. Check UCC website for due dates.

##### D.1. Approvals: required from programs/departments/deans who originate the proposal. may include multiple departments, e.g., for joint/interdisciplinary prposals.

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Lesley Bogad | Chair / Educational Studies  |  |  |
| James Magyar | Chair / Committee on General Education |  |  |
| Earl Simson | Dean / Faculty of Arts and Sciences |  | Tab to add rows |
| Gerri AugustJulie Horwitz | Deans / Feinstein School of Education and Human Development |  |  |
| Jeffrey Mello | Dean / School of Management |  |  |
| Debra Servello | Interim Dean / School of Nursing |  |  |
| Jayashree Nimmagadda | Dean / School of Social Work  |  |  |

##### D.2. [Acknowledgements](#acknowledge): REQUIRED from OTHER PROGRAMS/DEPARTMENTS IMPACTED BY THE PROPOSAL. SIGNATURE DOES NOT INDICATE APPROVAL, ONLY AWARENESS THAT THE PROPOSAL IS BEING SUBMITTED. CONCERNS SHOULD BE BROUGHT TO THE UCC COMMITTEE MEETING FOR DISCUSSION

| Name | Position/affiliation | [Signature](#Signature_2) | Date |
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