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

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| A.1. [Course or program](#Proposal) | **CSCI 428 Machine Learning** |  |
| [Replacing](#Ifapplicable)  |  |
| A. 1b. Academic unit | **School of Business**  |  |
| A.2. [Proposal type](#type) | **Course: revision**  |  |
| A.3. [Originator](#Originator) | **Timothy Henry** | [Home department](#home_dept) | **Computer Science and Information Systems** |
| A.4. [Context and Rationale](#Rationale) Must include additional information listed in smart tip for all [new programs](#type). If **online** course or program, you need to explain what mode(s) you plan to use and why you need that specific delivery.  | The original version of CSCI 428 was designed as a restricted elective for Computer Science, Computer Information Systems and Cybersecurity Majors. The course is being updated to also serve as a foundational course in the Artificial Intelligence major. Summary of changes:**Update pre-requisite to be CSCI 427 Artificial Intelligence Foundations.** Currently, the course is limited in the topics it can cover since not all students taking it have had CSCI 427 first. Much of the course must repeat concepts from CSCI 427. Machine Learning (ML) is a subfield of AI, and it's essential for students to grasp fundamental principles and concepts of AI before delving into the intricacies of ML algorithms and techniques. A foundation in AI provides a background for understanding the motivations, goals, and challenges of AI, laying the groundwork for a deeper comprehension of ML's role within the broader AI landscape. Adding the requirement of Calculus I allows the course to address important learning algorithms, such as gradient descent, that require a foundation in differential calculus. AI encompasses various approaches to achieving intelligent behavior, and ML algorithms are one of the primary tools used to implement AI systems. By understanding the different AI frameworks students can better appreciate how ML algorithms fit into these frameworks and how they are used to solve different types of problems.**Change to be Required for major/minor *and* Restricted elective for major/minor.** The course can still serve as a restricted elective for Computer Science, Computer Information Systems and Cybersecurity Majors, but it is important that AI Majors have a strong foundation in ML Algorithms and the ML process before taking courses such as CSCI 443 Natural Language Processing and CSCI 444 Computer Vision. Therefore, the course is required for the AI Major.**Course description updated to be student-oriented and better capture role of course in program, and making it a Spring offering.** |
| A.5. [Student impact](#student_impact)Must include to explain why this change is being made? | Students selecting this course as an elective must now take CSCI 427 first or get approval from department chair. In the past, most students who have taken CSCI 428 have already taken CSCI 427 the semester prior even though it was not a pre-requisite. This most likely will reduce the number of students taking this course as a restricted elective.  |
| A.6. [Impact on other programs](#impact)  | Since fewer students will most likely take this as an elective, other 300- or 400-level CSCI and CIS courses that serve as electives may see an increase in enrollment.  |
| A.7. [Resource impact](#Resource) | [*Faculty PT & FT*](#faculty):  | Existing CSCI faculty and/or adjunct faculty will teach the courses. Depending on the growth of the new AI Program, additional faculty and adjuncts may be needed. |
| [*Library*:](#library) | None |
| *Technology (for in person delivery)*The VP of Information Services should be consulted prior to submission and their acknowledgement signature included. | None. Courses will use existing classrooms and/or computer labs. |
| *Technology: (for online delivery. Must be RIC supported)*The VP of Information Services should be consulted prior to submission and their approval signature included. | None |
| [*Facilities*](#facilities): | None. Courses will use existing classrooms and/or computer labs. |
| A.8. [Semester effective](#Semester_effective) | **Fall 2024** | A.9. [Rationale if sooner than next Fall](#Semester_effective) | **N/A** |
| A.10. INSTRUCTIONS FOR CATALOG COPY: Use the Word copy versions of the catalog sections found on the UCC Forms and Information page. Cut and paste into a single file **ALL the relevant pages from the college catalog that need to be changed.** Use tracked changes feature to show how the catalog will be revised as you type in the revisions. If totally new copy, indicate where it should go in the catalog. If making related proposals a single catalog copy that includes all changes is preferred. Send catalog copy as a separate single Word file along with this form. |
| A.11. List here (with the relevant URLs), any RIC website pages that will need to be updated (to which your department does not have access) if this proposal is approved, with an explanation as to what needs to be revised: |
| A. 12 **Check to see if your proposal will impact any of our** [**transfer** **agreements,**](file:///Users/SAbbotson/Documents/Curriculum/ManualandWebsite/transfer%20agreements) **and if it does explain in what way. Please indicate clearly what will need to be updated, including any changes in prefix numbers/titles for TES.****N/A** |
| A. 13 Check the section that lists “Possible NECHE considerations” on the UCC Forms and Information page and if any apply, indicate what that might be here and contact Institutional Research for further guidance. **N/A** |

**C.** [**NEW OR REVISED COURSES**](#delete_if) **THAT ARE DESIGNATED AS HYBRID**

|  | Old  | New |
| --- | --- | --- |
| C.1. [Course prefix and number](#cours_title)  | **CSCI 428** |  |
| C.2. Cross listing number if any |  |  |
| C.3. [Course title](#title)  | **Machine Learning** |  |
| C.4. [Course description](#description)  | Students will learn to develop intelligent systems and analyze data.  Topics include supervised, unsupervised and deep learning algorithms.  Current packages and tools will be used to solve real-world problems. | **Students build, train, tune, test, and evaluate common machine learning models. Students apply best practices for responsible ML including identifying, measuring, and mitigating issues with bias and fairness.** |
| C.5. [Prerequisite(s)](#prereqs) | **CSCI 212W, or**[**CIS 470**](https://ric.smartcatalogiq.com/en/2023-2024/catalog/courses/cis-computer-information-systems/400/cis-470)**and**[**CSCI 157**](https://ric.smartcatalogiq.com/en/2023-2024/catalog/courses/csci-computer-science/100/csci-157)**, or consent of department chair** | **CSCI 209, CSCI 427, and MATH 212 or consent of department chair** |
| C.6. [Offered](#Offered) please read the screen tips to do this correctly, alternate years needs to be assigned odd/even, and a specific semester. | **As needed** | **Spring** |
| C.7. [Contact hours](#contacthours)  |  |  |
| C.8. [Credit hours](#credits) |  |  |
| C.9. [Justify differences if any](#differences) |  |

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| C.10. [Grading system](#grading)  |  |  |
| C.11. a. [Type of cours](#instr_methods)e  |  |  |
| C.11.b Instruction mode with percentage |  |  |
| C.11.c. For online components only: How will students engage with the content  |  |  |
| C.11.d. How will students engage with other students  |  |  |
| C.12. CATEGORIES 12. a. [How](#required) to be used | **Restricted elective for major/minor**  | **Required for major/minor |** **Restricted elective for major/minor** |
|  12 b. Is this an Honors course? |  |  |
|  12. c. [General Education](#ge) N.B. Connections must include at  least 50% Standard Classroom instruction. |  |  |
|  12. d. Writing in the  Discipline (WID) |  |  |
| C.13. [How will student performance be evaluated?](#performance)  |  |  |
| C.14 [Recommended class-size](#class_size) |  |  |
| C.15. [Redundancy statement](#competing) |  |  |
| C. 16. Other changes, if any |  |

| C.17**.** [**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) |
| --- | --- | --- |
| Determine if a business problem is a good candidate for a machine learning solution based on problem goal, available data, scalability, and other factors. |  | Homework, projects, in-class assignments, quizzes and exams. |
| Decompose an ML problem into the constituent steps in the ML Lifecycle. |  |
| Understand the importance of data pre-processing and feature engineering, and demonstrate how to perform each step effectively. |  |
| Implement different types of machine learning models, including tree-based models, regression models and ensembling models, and select and evaluate the best model for a given task. |  |
| Train, tune, test, and evaluate common machine learning models and how to use hyperparameter tuning to achieve better performance. |  |
| Understand the importance of fairness and bias mitigation in machine learning, and demonstrate how to ensure predictions made by a model are fair and unbiased. Apply bias measurements and mitigation techniques in order to measure and remove unwanted bias from all stages of the ML lifecycle. |  |

## **G. 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 their 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 to the current Chair of UCC. Check UCC website for due dates. **Do NOT convert to a .pdf.**

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

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Suzanne Mello-Stark | Chair of Computer Science and Information Systems | \*approved by email | 2/23/2024 |
| Rebecca Sparks | Chair of Department of Mathematical Sciences | \*approved by email | 2/23/2024 |
| Quenby Hughes | Dean of Arts and Sciences | \*approved by email | 2/23/2024 |
| Marianne Raimondo | Dean of School of Business | \*approved by email | 2/23/2024 |