# 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): [if not working select “COMMents on rollover” in your Word preferences under view] please read these.

**N.B. DO NOT USE HIGHLIGHT, where choices are given within categories, please DELETE those THAT DO NOT APPLY TO YOUR PROPOSAL. Do not delete numbered categories.**

**ALL numbers in section (A) to be completed, including the impact ones (#5-7), put “none” if that is the case.**

|  |  |  |
| --- | --- | --- |
| A.1. [Course or program](#Proposal) | **Math 245: Principles of Data science** |  |
|  |  |
| A.2. [Proposal type](#type) | **Course: creation**  |
| A.3. [Originator](#Originator) | **Stephanie Costa** | [Home department](#home_dept) | **Mathematics and Computer Science** |
| A.4. [Context and Rationale](#Rationale)  | **This course is intended to introduce students to the field of data science. Students will learn to use a statistical software package to become familiar with functions commonly used in statistical analysis and data management. Students will gain experience importing data sets from various sources and transforming data into a usable format. This course builds upon material mastered in Math 240 such as numerical and visual descriptive statistics and teaches students how to use software packages to create graphs, tables, and plots to aid in data visualization. In addition, students will learn more advanced techniques such as analysis of variance and be introduced to statistical modeling using simple and multiple regression with packages and functions in the utilized software.****The class will be capped at 24 students since a substantial amount of time will be spent in campus computer labs.** |
| A.5. [Student impact](#student_impact) | **This will be a great course for any student looking to learn more about mathematical modeling and gain experience using statistical software to manage and analyze data.**  |
| A.6. [Impact on other programs](#impact)  | **None.** |
| A.7. [Resource impact](#Resource) | [*Faculty PT & FT*](#faculty):  | **Current and existing full-time faculty will be used.**  |
| [*Library*:](#library) | **No additional needs are anticipated.** |
| [*Technology*](#technology) | **We expect current labs to be sufficient.** |
| [*Facilities*](#facilities): | **None** |
| A.8. [Semester effective](#Semester_effective) | **Fall 2020** | 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 single file along with this form. |

B. [NEW OR REVISED COURSES](#delete_if)  **DO NOT use highlight. Do not delete numbered categories, just leave blank if they do not apply. Delete this whole page if the proposal does not include a new or revised course. Always fill in b. 1 and B. 3 for context.**

|  | Old ([for revisions only](#Revisions))ONLY include information that is being revised, otherwise leave blank.  | NewExamples are provided within some of the boxes for guidance, delete just the examples that do not apply. |
| --- | --- | --- |
| B.1. [Course prefix and number](#cours_title)  |  | **MATH 245** |
| B.2. Cross listing number if any |  |  |
| B.3. [Course title](#title)  |  | **Principles of Data Science** |
| B.4. [Course description](#description)  |  | **Students will be introduced to statistical computing using an appropriate software package. Topics include techniques for visualizing and managing data, statistical modeling including regression, and ANOVA.** |
| B.5. [Prerequisite(s)](#prereqs) |  | **MATH 240 or MATH 248** |
| B.6. [Offered](#Offered) |  | **Fall, Spring** |
| B.7. [Contact hours](#contacthours)  |  | **4** |
| B.8. [Credit hours](#credits) |  | **4** |
| B.9. [Justify differences if any](#differences) |  |
| B.10. [Grading system](#grading)  |  | **Letter grade** |
| B.11. [Instructional methods](#instr_methods) |  | **Laboratory | Lecture | Small group |**  |
| B.12.[Categories](#required) |  | **Required for major in B.S. in Data Science** |
| B.13. Is this an Honors course? |  | **No** |
| B.14. [General Education](#ge)N.B. Connections must include at least 50% Standard Classroom instruction. |  | **No** |
| B.15. [How will student performance be evaluated?](#performance) |  | **Attendance | Class participation | Exams | Presentations |** **Class Work | Quizzes |** |
| B.16 [Recommended class-size](#class_size" \o "Check appendix XVIII in the UCC Manual for Best Practices) |  | **24 (computer lab)** |
| B.17. [Redundancy statement](#competing) |  | **The Department of Accounting and Computer Information Systems offers an Introduction to Data Science Course as part of their Data Science minor. Our course differs from theirs in that we use a different programming language and focus on mathematical modeling with regression and ANOVA. Students will utilize the software package and functions learned in this class in upper-level Data Science courses such as Math 345 and Math 445.**  |
| B. 18. 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)**?** |
| --- | --- | --- |
| Students will understand and use concepts and techniques in data collection, analysis, modeling, and statistical inference.  |  | R labs, exams, classwork |
| Student will choose, fit, and use mathematical models to solve problems. |  | R labs, exams, classwork |
| Students will use a high-level language to explore, visualize, and form hypotheses about data. |  | R labs, classwork |
| Students will understand the connections between the knowledge domains of mathematics, computer science and statistics and use a variety of skills from these domains to solve problems |  | R labs, exams, classwork |
| Students will receive raw data from a variety of sources and formats and then clean, transform, and structure the data for analysis. |  | R labs |
| Students will communicate data-based findings visually, orally, and in writing. |  | R labs, exams, classwork |

| B.19. [**Topical outline**](#outline)**: DO NOT INSERT WHOLE SYLLABUS, JUST A TWO-TIER TOPIC OUTLINE. Proposals that ignore this request will be returned for revision.** |
| --- |
| 1. Introduction to R a. Installing and running Rb. R Packagesc. Working with large data sets2. Working with Dataa. Data Structuresb. Data inputc. Functions for working with data sets3. Visualizing data - Basics a. The ggplot packageb. Working with graphs4. Data Management a. Creating new variablesb. Dealing with missing valuesc. Merging data setsd. Subsetting data sets. 5. More Data Visualization a. Bar plotsb. Pie chartsc. Histogramsd. Kernel density plotse. Box plotsf. Dot plotsg. Scatterplotsh. Scatterplot matrices6. Statistical Modelsa. Numerical descriptive statistics in R and associated packagesb. Generating frequency distributions and contingency tablesc. Chi-square tests in R d. Correlation coefficients and associated tests in R7. Regression a. Simple linear regressionb. Multiple linear regressionc. Model selection8. Analysis of Variancea. Introduction to ANOVA b. Q-Q plots and residual plotsc. Conditions for inference. |
|  |

## 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 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 and a printed signature copy of this whole 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 proposals.

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Stephanie Costa | Chair of Mathematics and Computer Science |  |  |
| Earl Simson | Dean of Arts and Sciences |  |  |

##### D.2. [Acknowledgements](#acknowledge): REQUIRED from OTHER PROGRAMS/DEPARTMENTS (and their relevant deans if not already included above) that are 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; all faculty are welcome to attend.

| Name | Position/affiliation | [Signature](#Signature_2) | Date |
| --- | --- | --- | --- |
| Lisa Bain | Chair of Accounting and Computer Information Systems |  |  |
| Jeff Mello | Dean of School of Business |  |  |