Instructor: E. Richardson  
Phone: (414) 803-0561  
Office Hours: by appointment  
E-Mail: erichardson@carrollu.edu

Prerequisites: Computational Thinking I (CMP 112)


Grading:  
- Homework average (40%; obj. 1-9),  
- 4 Journal Readings (20%; obj. 7-8),  
- 1 Midterm exam (20%; obj. 1; 3a),  
- Final exam (20%; obj. 1-9)

Tentative Schedule: We will do a CMP 112 topic review from the material in chapters 1-9 and 17-19, and then cover selected topics in chapters 10-16 and 20-23.

Final Exam: Wednesday, May 10 @ 6:00 pm

Grade Scale:

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<tr>
<th>Grade</th>
<th>Score Range</th>
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<tr>
<td>A</td>
<td>93-100</td>
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<td>AB</td>
<td>89-92</td>
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<td>B</td>
<td>83-88</td>
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<td>BC</td>
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<td>C</td>
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<td>D</td>
<td>60-69</td>
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<td>F</td>
<td>0-59</td>
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Course Topics:  
Computational science is a hybrid of analyses and tools that utilize techniques in data analysis, algorithmic design, and mathematical modeling. This course will emphasize analyses relevant to disciplines that depend on the crunching of data, while continuing to develop complementary thinking skills essential to doing modern science. To this end, the course will focus on techniques commonly used in the behavioral, biological, environmental and health sciences. The computer programming language Python will also be used as a way to achieve this goal.

Course Objectives:

At the end of this course, students should be able to do the following.

1. CMP 112 material including:
   a. Descriptive Statistics  
   b. Z- and t-Tests  
   c. 2-Sample t-Test  
   d. Linear Regression and Correlation

2. Apply ANOVA in the following cases:
   a. 1-Way ANOVA  
   b. Two-Factor ANOVA  
   c. Data Transformation Scenarios

3. Non-Parametric Statistics such as:
   a. Mann-Whitney U
b. Wilcoxon Rank Test
c. Kruskal-Wallis Test
d. Behrens-Fisher Test
e. Statistical Bootstrap Methods

4. Multiple Regression and Correlation
5. Goodness of Fit and Test for Independence
6. Contingency Tables
7. Have a qualitative understanding of the mathematics models utilized in the above
8. Have a general understanding of Experimental Designs relevant to the above
9. In their respective cases, use Python, Excel or SPSS to execute the above

Course Policies:

Academic Integrity: All work on assignments, quizzes and tests is expected to be your own and represent your ability in course content. The Carroll University Academic Integrity Policy is located in your student handbook. Please familiarize yourself with this policy. If a student violates this policy in any way, the instructor or College reserves the right to impose a sanction of failure on the assignments/assessment or failure in the course.

Attendance: It is expected that you attend every lecture. You will be accountable for all material covered with no exceptions.

Journal Readings: Over the course of the term, students will be required to read 4 scholarly journal articles that include statistical analysis of experiments in their field of study and give a short (5 minute) presentation. The presentation will include summaries of the experimental design, the statistics used to analyze the data, and the results of the experiment.

Homework: Homework will be assigned as an aid to learning the material as well as an impetus for class discussion. It is expected that completing the assigned problems and reading the section to be covered in the next class will require up to two hours each night. Homework may consist of problems from the book, handouts, or both. Late work will not be accepted without prior arrangements or a valid medical excuse.

Tests: There will be one midterm exam and a final exam. Due to the nature of mathematics, each test should be considered cumulative. All tests will be open book/notes.

Accommodation for Disabilities: If you need accommodations for a documented disability, or are considering obtaining documentation, you should make an appointment with Martha Bledsoe, our disabilities coordinator, no later than the first week of class. She can be reached by calling 524-7335 or contacting her via e-mail at mbledsoe@carrollu.edu. It is your responsibility to get any paperwork turned in to me as soon as possible so that I am able to make the required accommodations.

Carroll Portal (MyCourses): This class will use the Carroll Portal for various purposes. Homework assignments will be posted there; so will any handouts/resources you will need. Your grades will be posted there when available.

The instructor and the University reserve the right to modify, amend, or change the syllabus, course requirements, grading policy, etc., as needed. Students will be notified of any changes during the lecture periods.