Syllabus

Instructor: Prof. Natasha Sahr
Office: TBD
Phone: (414) 600-9434
Office Hours: Monday and Tuesday 5:00 PM to 6:00 PM or by appointment
E-Mail: nsahr@carrollu.edu

Prerequisites: Computational Thinking I (CMP 112)


Grading: 

Homework - 40%
20% 4 Journal Summary Reports (5% each)
20% 5 Homework Assignments (5% each) – lowest grade dropped

Presentation - 20%
20% Group Presentation of Journal Summary

Exams - 40%
20% Online Midterm exam due 3/20
20% Online Final exam due 5/8

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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. Computer programming languages (Python, SPSS, SAS, and R) and MS Excel will also be used to achieve this goal.

Course Objectives:
At the end of this course, students should be able to do the following.
1. CMP 112 material: Descriptive Statistics, Z- and t-Tests, 2-Sample t-Test, Linear Regression and Correlation
2. ANOVA applications: 1-Factor ANOVA, Two-Factor ANOVA, Data Transformation Scenarios
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. Use computational devices (Python, SPSS, SAS, and R) 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.
Spring 2017: CMP 114 Computational Thinking II (4 Credits)
Monday 6:00-9:35 PM in New Hall TC23
Prof Natasha Sahr

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 articles that include statistical analysis of experiments in their field of study. The final article will be reviewed as a group (4-5 people) and the group will be required to give a short (15 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.

**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 completed online. Online tests will:
- Be open for two weeks with the open date and close date stated on tentative schedule with time at 6:00PM central;
- Have the ability to re-enter the exam software an unlimited number of times during the open period;
- Not be accepted if submitted late; and,
- Not be modified with corrections submitted via comment or email unless otherwise stated.

**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 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 can 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.
### Tentative Schedule

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<tr>
<th>Week</th>
<th>Description</th>
<th>Assignments</th>
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<tr>
<td>Week 1: (Jan 30)</td>
<td><strong>Review</strong>: data types, populations and samples, the normal distribution</td>
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<td>Week 2: (Feb 6)</td>
<td><strong>Review</strong>: measures of central tendency, measures of variability and dispersion</td>
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<td>Week 3: (Feb 13)</td>
<td><strong>Review</strong>: hypothesis testing</td>
<td><strong>Paper 1</strong></td>
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<td>Week 4: (Feb 20)</td>
<td><strong>Review</strong>: One sample hypothesis testing (1-sample z- and t-tests, Wilcoxon Signed-Rank test, variance test), confidence intervals</td>
<td><strong>HW 1</strong></td>
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<td>Week 5: (Feb 27)</td>
<td><strong>Review</strong>: Two sample hypothesis testing (2-sample z- and t-test, Behrens-Fisher test, Mann-Whitney U, variance ratio test)</td>
<td><strong>Paper 2</strong></td>
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<td>Week 6: (Mar 6)</td>
<td>Hypothesis testing for proportions and frequencies (1- and 2-proportion tests), confidence intervals</td>
<td><strong>HW 2</strong></td>
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<td>Week 7: (Mar 13)</td>
<td><strong>SPRING BREAK</strong></td>
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<td>Week 8: (Mar 20)</td>
<td>Goodness-of-fit tests, tests for independence</td>
<td><strong>Midterm Exam</strong></td>
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<td><strong>Online</strong></td>
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<td>Week 9: (Mar 27)</td>
<td>One-factor ANOVA, Kruskal-Wallis</td>
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<td>Week 10: (Apr 3)</td>
<td>2-factor ANOVA</td>
<td><strong>HW 3</strong></td>
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<td>Week 11: (Apr 10)</td>
<td>Multiple comparison testing, example presentation</td>
<td><strong>Paper 3</strong></td>
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<td>Week 12: (Apr 17)</td>
<td>Linear regression</td>
<td><strong>HW 4</strong></td>
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<td>Week 13: (Apr 24)</td>
<td>Test for normality</td>
<td><strong>HW 5</strong></td>
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<td>Week 14: (May 1)</td>
<td><strong>Paper 4 GROUP</strong> presentations</td>
<td><strong>Paper 4</strong></td>
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<td>Week 15: (May 8)</td>
<td><strong>Paper 4 GROUP</strong> presentations</td>
<td><strong>Final Exam</strong></td>
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<td><strong>Online</strong></td>
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<td><strong>Opened on: 4/24</strong></td>
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<td><strong>Closes on: 5/8</strong></td>
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Journal Article Summary Guidelines (30 pts)

Your article summary should do the following:

- (2 pts) Describe the problem
- (8 pts) State which statistical methods were used and why
- (8 pts) Report the sample size, test statistic, and p-value
- (8 pts) Report conclusions of the paper
- (2 pts) Describe the relevance to CMP 114 material covered
- (2 pts) Describe the relevance to your career/life

Format:

- Times New Roman
- 12-point font
- Double-spaced
- 1 inch margins
- ½ - 1 page

Summaries will only be accepted ONLINE by 6:00PM on the due date as specified on the tentative schedule. Summaries submitted in another format or after the deadline will receive no credit!