CRN 2790

IST 130 Analytical Methods: Statistics Section 101

**Course Syllabus – Fall 2014, MTWRF 11:00-11:50 AM COS 166**

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| Instructor: **E. David Cartwright** Office: **ML 112** and **TTE TLC** | E-mail: **david.cartwright@marshall.edu** |
| Telephone: **(304) 417-5227** (cell) | Office Hours: **MTWRF 8-9:15 am.** Other times by appointment.  |

**Course Description:** The student will develop an understanding of the basic ideas of statistical rea­soning. The course will cover basic probability and statistics, including sampling and experimental design, graphical representation of data, basic descriptive statistics, randomness and probability models, the nor­mal distribution, regression, the t test, conﬁdence intervals, hypothesis testing, and the Chi-Square test. The student will also learn Excel and basic R statistical software to preform data analysis and draw conclusions from data.

**Required Text, Additional Reading, and Other Materials:** “Practical Statistics for Environmental and Biological Scientists” by John Townend, and websites

**Course Student Learning Outcomes and Assessment Measures:**

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| Course Student Learning Outcome  | How Practiced in this Class | How Assessed in this Course  |
| Demonstrate basic underpinning of statistics, i.e., inference of populations using sample data. | Class lecture (CL), Hands on examples and discussion (HOED) | Labs(L), Homework(H), Exams(E), Projects(P)  |
| Describe data using summary statistics (measures of central tendency and variability) and/or graphs and charts, by use of spreadsheets. | CL, HOED | LHEP |
| Design and implement an appropriate experimental plan to gather randomized data, and to use software to record the data. | CL, HOED | LHEP |
| Use appropriate statistical tests to determine the difference of means and variances with one, two or more populations using t, ANOVA, MANOVA or their non-parametric counterparts | CL, HOED | LHEP |
| To use Excel and R to complete an statistical analysis | CL, HOED | LHEP |
| Interpret graphical summaries of data. | CL, HOED | LHEP |
| Interpret numerical summaries of data. | CL, HOED | LHEP |
| Use normal and other distributions to describe real word phenomena. | CL, HOED | LHEP |
| Use conﬁdence intervals to estimate means, with a spreadsheet. | CL, HOED | LHEP |
| Describe and interpret relationships between measurement variables by means of a regression model with a spreadsheet. | CL, HOED | LHEP |
| Determine sample size by use of pilot studies. | CL, HOED | LHEP |
| Critically analyze and evaluate published results of statistical studies. | CL, HOED | LHEP |

**Course Requirements and Grading:**

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| Reading Quizzes  | 10% |
| In-class Lab Exercises | 10% |
| Homework | 10% |
| Project #1 | 15% |
| Project #2 | 25% |
| Exams (three @ 10% each) | 30% |
| Total | 100% |

Final letter grades are determined based on the following grading scale:

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| --- | --- | --- | --- | --- |
| [0,60) | [60,70) | [70,80) | [80,90) | [90,100] |
| F | D | C | B | A |

The instructor reserves the right to change these values depending on the overall class performance and/or extenuating circumstances.

**Lab activities:** Lab activities include group discussions, participatory reviews, experiments and computer exercises. Lab activities will be collected in lab.

**Homework assignments:** Late assignments and labs will not be accepted.

**Exams**: There will be no make-up chances for missed exams unless a proper action has been taken for an excused absence.

**Attendance Policy:** Attendance is strongly encouraged. If necessary, quizzes will be given to ensure your interest in attending. Students generally perform much better if their attendance is consistent. Low attendance is often a strong indication to a failing grade. If you are absent, it is your responsibility to find out what you missed, e.g. announcements, assignments, etc.

**Class preparation:** Preparation is necessary for learning. ***For this class, reading the textbook chapters before coming to class is an absolute necessity.*** In class quizzes will be used to assess this.

University Computing Services’ Acceptable Use Policy: All students are responsible for knowing this policy, which can be found on the web at [http://www.marshall.edu/ucs/CS/accptuse.asp.](http://www.marshall.edu/ucs/CS/accptuse.asp)

Academic Dishonesty Policy: All students should be familiar with the university’s policy concerning academic dishonesty. This policy can be found on pp. 102–106 of the undergraduate catalog
[http: //www.marshall.edu/catalog/undergraduate/ug\_09-10.pdf.](http://www.marshall.edu/catalog/undergraduate/ug_09-10.pdf) or on pp. 61–64 in the spring 2009 online graduate catalog [http://www.marshall.edu/catalog/Graduate/S2009/gr\_sp09\_published.pdf.](http://www.marshall.edu/catalog/Graduate/S2009/gr_sp09_published.pdf)

Policy for Students with Disabilities: Marshall University is committed to equal opportunity in education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Oﬃce of Disabled Student Services (DSS) in Prichard Hall 117, phone 304 696-2271 to provide documentation of their disability. Following this, the DSS Coordinator will send a letter to each of the student’s instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, please visit <http://www.marshall.edu/disabled>or contact Disabled Student Services Oﬃce at Prichard Hall 117, phone 304-696-2271.

**Tentative Course Outline**

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|  | **Weekof** |  | **Topics to be covered** | **Labs, Quizzes, Exams and Projects** |
| 1  | 8/25 | M-F | Syllabus; Motivation and Summary Statistics (Ch 1-2)Project 1 assigned | L1: Data TendenciesL2: Data analysis tool-pack, CI’s, t-tests Quiz 1 (Chapter 2) |
| 2  | 9/1 | W-F | Monday, Labor Day, No ClassDesign of Experiments Introduction (Ch 3-4) | Q2 (Chapter 3)Q3(Data Types)L3:Test Types |
| 3  | 9/8 | M-F | Design of Experiments (Ch 4)Project 1 due | Q3 (Chapter 3) |
| 4  | 9/15 | M-F | Data Analysis and Presentation (Ch 5) Assumptions (Ch 6) | Q4(Chapter 5)L4: Data Analysis and PresentationQ5:(Chapter 6) |
| 5  | 9/22 | M-F | ReviewTest 1No Class Thursday, Trumpets | L6: Chi-SquaredQ6: Chapter 12 |
| 6  | 9/29 | M-F | Chi-Squared Test (Ch 12)t-test and F-tests (Ch 7) Projects Begin | Q7: Chapter 7L7: t and F-tests |
| 7  | 10/6 | M-F | M,T ClassesANOVA (Ch 8)No Class Thursday, Tabernacles | Q8: Chapter 8L8: ANOVA One Way |
| 8  | 10/13 | M-F | Multiway ANOVA (Ch 8)No Class Thursday, Tabernacles | L9: ANOVA Two Way |
| 9  | 10/20 | M-F | Review, Test 2Correlation and Regression (Ch 9) | Q9: Chapter 9 L10: CorrelationL11: Regression |
| 10  | 10/27 | M-F | Correlation and Regression |  |
| 11  | 11/3 | M-F | PCA (Ch 13) | Q10: Chapter 13 L10: PCA |
| 12  | 11/10 | M-F | Review, Test 3 |  |
| 13  | 11/17 | M-F | Project Week | Project Ends, Final Discussed |
| 14  | 11/24 | M-F | Fall Break |  |
| 15  | 12/1 | M-F | Dead Week, Project Presentations, Review |  |
| 16 | 12/8 | M-F | Final exam, Tuesday December 9, 11 am |  |