**IST 130: Analytical Methods: Statistics (4 Credits)   
Course Syllabus – Fall, 2014**

|  |  |  |  |
| --- | --- | --- | --- |
| **Instructor:** | David A. Graefe, Ph.D. | **Class Meets:** | Monday and Wednesday 3:00 – 4:50 PM |
| **Office:** | 201 Prichard Hall | **Classroom:** | Science Building, Room 166 |
| **Phone Number:** | (304) 696-2608 | **Office Hours:** | Monday 10:00 AM – 12:00 PM  Tuesday 1:00 PM – 3:00 PM  Wednesday 10:00 AM – 12:00 PM  Or by appointment |
| **E-Mail:** | graefe@marshall.edu |

**Course Description (from catalog):**

Students develop an understanding of statistical reasoning through the use of software to generate, summarize, and draw conclusions from data. This course enhances statistical technique dexterity through analysis of applied problems.

**More Description:**

Students will develop an understanding of the basic ideas of statistical reasoning. The course will cover basic probability and statistics, including sampling and experimental design, numerical and 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. Students will also use Excel and SPSS statistical software for analyzing and drawing conclusions from data.

**Course Format:**

Class will meet on Monday and Wednesday each week from 3:00 to 4:50 PM, unless otherwise specified by the instructor or course schedule. Materials will be presented and discussed using lectures, in-class discussions, and class projects and presentations. Students will be expected to attend class and participate in class discussions, complete written homework assignments, and take in-class quizzes and exams.

**Required Texts, Additional Reading, and Other Materials:**

Required texts:

* Townend, J. (2002). *Practical statistics for environmental and biological scientists.* England: John Wiley & Sons, LTD.
* Other readings as assigned and provided by the instructor.

Suggested titles for further study (not required):

* Klein, G. & Dabney, A. (2013). *The cartoon introduction to statistics*. New York, NY: Hill and Wang.
* Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation, and human dimensions.* State College, PA: Venture Publishing Inc.

Assigned readings are an essential component of this course and provide students with a baseline of knowledge that will be expanded upon through more detailed and complex in-class lectures and discussions. Students will be required to complete assigned readings prior to the class period in which the material will be discussed.

Supplemental course materials (e.g., handouts, reading assignments, etc.) will be posted to the Blackboard website (<http://www.marshall.edu/muonline/>).

**Desired Objectives/Outcomes:**

|  |  |  |
| --- | --- | --- |
| **Student Learning Outcomes** | **How Practiced in this Course** | **How Assessed in this Course** |
| Demonstrate a basic understanding of statistics. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Describe data using summary statistics (measures of central tendency and variability) and/or graphs and charts, by use of spreadsheets. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Design and implement an appropriate experimental plan to gather randomized data, and to use software to record the data. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| 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. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Analyze data using statistical software (Excel and SPSS). | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Create and interpret graphical summaries of data. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Create and interpret numerical summaries of data. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Use normal and other distributions to describe real word phenomena. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Use conﬁdence intervals to estimate population means with sample data. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Describe and interpret relationships between measurement variables by means of correlation and regression. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Determine sample size by use of pilot studies. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |
| Critically analyze and evaluate published results of statistical studies. | Class lectures and discussions, assigned readings, in-class examples | Quizzes, lab exercises, homework, exams, projects. |

**University Policies:**

By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802>

Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

**Attendance Policy and Make-up Work:**

In-class participation is an essential component of this course and students will be expected to attend each class unless they have a valid university-approved excuse (see university excused absence policy). I will be happy to meet with students who miss class with a valid excuse to discuss course material and how missed work can be made up. However, I will not re-lecture to students who miss class during office hours, and it will be the students’ responsibility to catch up on missed material (e.g., readings, in-class exercises, etc.).

**Assignment Submission and Late Policy**

All homework assignments must be turned in **at the beginning of class** on the specified due date. Except under special circumstances with written justification, assignments turned in after the due date will be penalized with a 10% reduction in points for each day late, including Saturdays and Sundays (i.e., one day late = 90% highest possible score, two days late = 80% highest possible score, etc.).

In-class quizzes and lab assignments will not be accepted late (i.e., there will be no opportunity to make up any missed in-class quizzes or lab exercises), except under special circumstances with written justification and prior approval. If your absence is unexcused, you will not be given an opportunity to make up any missed in-class assignments. In order to receive an excused absence, you must visit the office of academic affairs to obtain a written excused absence form.

**Course Requirements and Grading Policy:**

Students will be evaluated in this course based on their performance in the following categories…

* Quizzes – Students are required to attend and actively participate in each class throughout the semester. Students are also expected to complete reading assignments prior to the class period in which the materials will be discussed. In order to assess compliance with these expectations, I will be administering several unannounced, in-class pop-quizzes related to reading assignments at random throughout the semester. Students who miss a class period without having a university approved excused absence will receive a score of zero for any quiz given during that class period. However, I will drop the lowest quiz score for each student before determining his/her overall course grade (i.e., the results of your worst quiz will not affect your overall grade). This policy will be beneficial to students who complete readings and attend class on a regular basis.
* Labs/In-Class Exercises – Students will be required to complete several hands-on lab exercises in class. These labs will be essential for demonstrating how to conduct statistical analyses using software such as Microsoft Excel and SPSS. Lab exercises must be handed in during class. Late or make-up labs will not be accepted, except under special circumstances with written justification.
* Homework Assignments – Students will be required to complete several written homework assignments throughout the course of the semester. The content and format will vary and will be specified for each assignment. Grading of written assignments will be based both on what is presented (content) as well as the style and adequacy of the presentation (process). Written assignments should be neat, succinct, and clear. All homework assignments must be typed (12 –point font, double-spaced), printed, and handed in at the **beginning** of class on the date the assignment is due (see Late Policy for more detail).
* Examinations – There will be three written mid-term examinations that will be administered during specified class periods this semester (see course schedule). Any student who misses an exam due to an unexcused absence will receive a 0% for that exam (see make-up exam policy).
* Projects – Students will be required to complete two individual projects throughout the course of the semester. The first will require an in-depth review of a research project and a presentation of your findings to the class. The second will require you to design and carry out a research project of your own, and present results to the class. Each student will prepare a written paper and a multimedia presentation to be delivered in front of the class for each of these projects. The second project (your own research study) will be completed in lieu of a final exam.

The aforementioned evaluation categories will contribute to your overall course grade as follows:

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

This class will employ a weighted grading system. To determine your grade in this course, fill in your percentage score for each evaluation category below, multiply each score by its weight, and then add the values in the final grade column to find your overall grade out of 100. In addition to handing graded assignments back to you in class, I will post grades for individual assignments and exams on blackboard. However, please remember that you **must** use the weighted grading system shown below to determine an accurate portrayal of your overall course grade. I am happy to meet with you to discuss your course progress/grade during office hours throughout the semester.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Evaluation Category** | **Your Score**  **(out of 100)** |  | **Weight** |  | **Contribution to**  **Final Grade** |
| Quizzes (average) | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| Lab exercises (average) | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| Homework (average) | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| Project #1 | \_\_\_\_\_\_\_\_\_ | X | .15 | = | \_\_\_\_\_\_ |
| Project #2 | \_\_\_\_\_\_\_\_\_ | X | .25 | = | \_\_\_\_\_\_ |
| Exam #1 | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| Exam #2 | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| Exam #3 | \_\_\_\_\_\_\_\_\_ | X | .10 | = | \_\_\_\_\_\_ |
| **Final Grade (out of 100)** | | | | = | **\_\_\_\_\_\_** |

Final letter grades will be determined using the following scale:

|  |  |  |
| --- | --- | --- |
|  | 90-100 | A |
|  | 80-89 | B |
|  | 70-79 | C |
|  | 60-69 | D |
|  | Below 60 | F |

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

**Academic Dishonesty Policy:**

Academic Dishonesty will not be tolerated in this or any other course at Marshall University. As a member of this class, it is your responsibility to read and abide by rules set forth in the official Marshall University Academic Dishonesty Policy. Acts of academic dishonesty include cheating, fabrication/falsification, plagiarism, bribes/favors/threats, and complicity (i.e., helping others to commit dishonest acts). Anyone found to be cheating, plagiarizing the work of others, or violating this policy in any other way will be subject to serious penalties including failure of the course. In extremely flagrant cases, additional sanctions may be pursued through the Office of Judicial Affairs. Please refer to the Marshall University Undergraduate Catalog for a full definition of academic dishonesty.

**Make-up Exams:**

Make‑up exams will not be given except under unusual circumstances with satisfactory written justification. Any student who misses an exam due to an unexcused absence will receive a grade of zero for that exam with no opportunity for make-up or substitution. Students who miss an exam because of a genuine emergency or university excused absence will be granted a make-up exam (provided that the reason for the absence is given prior to missing the exam – call and leave a message if you have to). Make up exams must be taken within one week of the original scheduled date. The decision of whether to give a make-up exam rests with the instructor.

**Communication:**   
I will post course content on Blackboard (e.g., syllabus, assignments, readings, etc.), so be sure to check for new materials regularly. Your MU e-mail address will be used to make any general announcements, last minute schedule changes, etc. I recommend that you monitor your MU email and Blackboard accounts at least once a day. Also, I will only respond to emails that you send me from your official MU email address – it is the only way for me to be sure that I am responding to you (and not someone else pretending to be you).

**Classroom Learning Environment:**   
To maintain the best possible environment for learning, the following standards for acceptable behavior will be followed by all students in this class:

* Turn off all cell phones and pagers before entering class. Do not text during class.
* Be on time for class and don’t leave early.
* Don’t have conversations during class that distract others.
* Don’t disparage other students – treat all class members respectfully.
* Don’t use profanity in class.
* Do not use tobacco during class.

Students who violate these standards and policies will be asked to leave class.

**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 11, phone 304-696-2271.

**Course Schedule and Due Dates:**

This is a tentative schedule and it may change as the class progresses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Day** | **Topic** | **Assignment** |
| 8/25 | M | Course intro, syllabus overview, **assign project #1** | Chapter 1 |
| 8/27 | W | Introduction to statistics and research, types of variables/data, summary statistics (central tendency, variation) | Chapter 2, Lab 1a |
| 9/1 | M | **No Class – Labor Day** |  |
| 9/3 | W | Review summary statistics, central limit theorem, confidence intervals, hypotheses, errors | Chapter 2, Lab 1b |
| 9/8 | M | Research Design – experiments and surveys, levels of measurement, statistical techniques | Chapter 3-4, Lab 2 |
| 9/10 | W | Research Design – experiments and surveys, levels of measurement, statistical techniques | Chapter 3-4 Lab 3 |
| 9/15 | M | Data analysis and presentation | Chapter 5, Lab 4 |
| 9/17 | W | Assumptions of statistical methods | Chapter 6, Lab 5 |
| 9/22 | M | **Project #1 presentations** | Project #1 due |
| 9/24 | W | Review |  |
| 9/29 | M | **Exam #1 (Chapters 1-5)** |  |
| 10/1 | W | Chi-Square tests, introduce project #2 | Chapter 12, Lab 6 |
| 10/6 | M | **Library day, research time for project** | Chapter 8, Lab 7 |
| 10/8 | W | t-tests and F-tests | Chapter 7, Lab 8 |
| 10/13 | M | ANOVA | Chapter 8, Lab 9 |
| 10/15 | W | Multi-way ANOVA | Chapter 8, Lab 10 |
| 10/20 | M | Multi-way ANOVA | Chapter 8, Lab 11 |
| 10/22 | W | Review |  |
| 10/27 | M | **Exam #2** |  |
| 10/29 | W | Correlation and Regression | Chapter 9, Lab 12 |
| 11/3 | M | Correlation and Regression | Chapter 9, Lab 13 |
| 11/5 | W | PCA | Chapter 13, Lab 14 |
| 11/10 | M | Review |  |
| 11/12 | W | **Exam #3** |  |
| 11/17 | M | Project week | Progress Reports |
| 11/19 | W | Project week | Progress Reports |
| 11/24 | M | **No Class – Fall Break!** |  |
| 11/26 | W | **No Class – Fall Break!** |  |
| 12/1 | M | **Project #2 presentations** | Project #2 due |
| 12/3 | W | **Project #2 presentations** |  |

Every student is responsible for all materials presented in class, including lectures, notes, and handouts. In case you are not present for a class, you should contact me to receive information about the material presented in that class. Class attendance is very important.