**CCBC, Spring 2016 School of Mathematics and Science**

**Math 153, Introduction to Statistical Methods, EU1 Math Department**

**Description:** Students will develop an understanding of statistical methodology and use of critical judgment in analyzing data sets. Topics include descriptive statistics, introduction to probability, normal and binomial distributions, hypothesis testing, confidence intervals, regression and correlation, and chi-square distribution. A statistical computer package, e.g. Minitab, is introduced as a computational tool and integrated throughout the course.

**Prerequisites:** MATH 083 or MATH 073 or sufficient math placement score; and ENGL 052 or ESOL 052 and RDNG 052 or ESOL 054 or ACLT 052.

1. Basic Course Information
   1. Instructor: Anthony Calise
   2. Office number: 443-840-1837

Email address: [acalise2@bcps.org](mailto:acalise2@bcps.org) or [acalise@ccbcmd.edu](mailto:acalise@ccbcmd.edu)

Website: www.mrcalise.weebly.com

* 1. Instructor's office hours: 8:00 – 9:00am S & 6:20 – 7:20 T/Th Rm: MASH 310
  2. Mathematics Department Phone Number (Essex): 443-840-1837
  3. Class meeting date/times: Sat. 12:45 – 5:00 pm
  4. Statement of Student Out of Class Work Expectations:

This is a **four-credit/billable hour course offered over 14 weeks.** You are expected to complete **at least 8 hours of work per week outside** of the class including reading, class preparation, homework, studying, etc.

* 1. Materials:
     1. *Textbook* – Elementary Statistics 12th Edition, by Mario Triola, Pearson publishing company. It is offered as a 3-hole punch text packaged with MyStatLab which includes access to StatCrunch for homework assignments (ISBN – 0321869478).
     2. *Software and supplies* - MINITAB software will be used primarily for in-class work. You can find MINITAB on the computers in our classroom, the library, and the Student Success Center. If you would like to have MINITAB on your personal computer, you can download a 30-days free trial or a 6 month rental at <http://www.onthehub.com/minitab> .

1. Course Goals Overall
   1. Course objectives as listed on the official Common Course Outline

Upon successful completion of this course students will be able to:

1. demonstrate statistical reasoning in everyday life using real world data;

2. select appropriate technology to manage data, explore data, perform inference, and check conditions;

3. describe data with appropriate measures of central tendency and variability;

4. generate and interpret statistical graphs;

5. analyze bivariate data using linear regression;

6. compare and contrast research of data from diverse cultural and global populations;

7. construct and interpret probability models for discrete random variables;

8. solve a normal probability distribution application;

9. apply the fundamentals of probability in application;

10. construct and interpret confidence intervals in order to make inferences about parameters;

11. perform hypothesis testing to draw inferences regarding parameters;

12. perform a test of independence using the chi-square distribution;

13. construct a solution to real world problems using problem methods individually and in teams;

14. examine the mathematical/statistical contributions made by people from diverse cultures locally, globally, and throughout history;

15. identify and critically evaluate the ethical issues at stake in individual and collective decisions;

16. effectively communicate the results of a statistical analysis; and

17. apply statistical methods to data from diverse cultural and global populations.

* 1. Major Topics as listed on the official Common Course Outline
     1. Introduction
        1. Statistical terminology.
        2. Sampling Techniques
        3. Statistical literacy
     2. Descriptive Statistics
        1. Graphs
        2. Measures of Central Tendency
        3. Measures of Variability
        4. Measures of Position
     3. Probability
        1. Fundamentals and basic concepts
        2. Addition rule
        3. Multiplication rule
        4. Conditional Probability
     4. Discrete Random Variables
        1. Probability Distributions
        2. Expected Value and Standard Deviation
        3. Use and interpret binomial probabilities
        4. Mean and standard deviation of a binomial random variable
     5. Normal Distribution
        1. Characteristics of the normal distribution
        2. Use and interpret normal probabilities
     6. Sampling Distributions
        1. Central Limit Theorem(CLT)
        2. Mean and Standard Error
        3. Apply CLT in application
     7. Estimates and Confidence Intervals
        1. Introduction to the t-distribution
        2. Confidence Interval for a population mean
        3. Confidence Interval for a population proportion
     8. Hypothesis testing
        1. Purpose of a hypothesis test
        2. Hypothesis test of a population mean
        3. Hypothesis test of a population proportion
        4. Hypothesis testing for two population proportions and means
     9. Regression and correlation
        1. Scatter plot
        2. Use and interpret the correlation coefficient
        3. Use and interpret the linear regression
     10. Chi-Square Distribution
         1. Test of Independence
  2. Rationale

Statistics is used in a great number of areas such as business, psychology, nursing and medicine, biology, and the social sciences. This course will provide the basics of descriptive and inferential statistics so that students will be more able to read and interpret research articles in the student's field. In addition, the student should be better able to understand statistics as it is used in everyday life and in newspaper and magazine articles.

1. Evaluation
   1. Requirements (papers, oral reports, projects, quizzes, tests, final exam, etc.)

*3-4 Exams (TBA), Final Exam, 4 Homework Assignments and 2 Projects*

* 1. Instructor’s grading policy

1. Test(s) 40% of course grade
2. Final Exam 30% of course grade
3. Projects (2) 20% of course grade
4. Homework 10% of course grade

|  |  |
| --- | --- |
| **Final Average** | **Final Grade** |
| At least 90% | A |
| At least 80% and less than 90% | B |
| At least 70% and less than 80% | C |
| At least 60% and less than 70% | D |
| Less than 60% | F |

* 1. Math Department Attendance policy:

1. You are expected to attend ALL scheduled classes.
2. Attendance is critical to student success in college.
3. Satisfactory attendance is defined to be at most 6 hours of unexcused absences.
4. Documentation of the reason for your absence(s) may be required.
5. The instructor may count each unexcused tardy arrival as an absence and each unexcused early departure as an absence.
   1. Math Department Audit policy: Students may change from credit to audit only during the published 50% refund period, as indicated in the CCBC academic calendar. Students who audit are required to attend class, participate in course activities, and complete assignments (except for tests and the final exam) in accordance with instructor guidelines and due dates. For students who do not meet these requirements, the instructor may change their grade from AU to W.
6. Course Procedures
   1. College wide syllabus policies: [“For college wide syllabus policies such as the Code of Conduct related to Academic Integrity and Classroom Behavior or the Audit/ Withdrawal policy, please go to the Syllabus Tab on the MyCCBC page](https://myccbc.ccbcmd.edu/Pages/Default.aspx).”
   2. Contact information for course-related concerns: Students should first attempt to take concerns to the faculty member. If students are unable to resolve course-related concerns with the instructor, they should contact Mathematics Department Essex coordinator, Sylvia Sorkin, at [ssorkin@ccbcmd.edu](mailto:ssorkin@ccbcmd.edu) or 443-840-2661.
   3. Other material related to Course Procedures
   4. Course calendar/schedule

Spring 2016 Academic Calendar and final exam schedule: <http://www.ccbcmd.edu/~/media/CCBC/Resources%20for%20Students/Academic%20calendar/finalexams_spring.ashx>

The Final Exam for this course is scheduled for 5/19 at 7:30pm

E. Tentative Homework List based on Triola Textbook, 12th edition:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Chapter | Section | | Title | Suggested Exercises | Time |
| 1 | 1-2 | Statistical and Critical Thinking | | # 1-21 odd, 25-28, 29, 31, 33 | 0.5 week |
| 1-3 | Types of Data | | # 1-4 all, 5-17 odd, 21-27 odds |
| 1-4 | Collecting Sample Data | | # 1, 3, 5, 7, 9, 11, 13, 15, 21, 23 |
| 2 | 2-2 | Frequency Distributions | | # 3, 5, 9, 11, 15, 17, 21, 27, 31, 33 (optional) | 1.0 |
| 2-3 | Histograms | | # 2, 3, 5 -8 all, 11, 17 |
| 2-4 | Graphs that enlighten and those that deceive | | # 1-5 odd, 9, 11, 13, 16, 18, 22, 23, 24 |
| 3 | 3-2 | Measures of Center | | # 1, 2, 3, 5, 9, 10, 15, 17, 23, | 1.5 |
| 3-3 | Measures of Variation | | # 4, 5, 9, 15, 17, 23, 26, 30, 41, 43 |
| 3-4 | Measures of relative standing and boxplots | | # 1-9 odd, 15–25 odd, 18, 20, 31, 34 |
| 4 | 4-2 | Basic Concepts of Probability | | # 1, 3, 5, 13-19 odd, 31-39 odd | 1.0 |
| 4-3 | Addition Rule | | # 1, 3, 5, 8, 9, 11, 13, 21-25 all, 33-38 all |
| 4-4 | Multiplication Rule: Basics | | # 3, 5, 13, 21, 25, 26 |
| 4-5 | Complements and Conditional Probability | | # 5, 9, 15, 19-23 all |  |
| 5 | 5-2 | Probability Distributions | | # 1, 2, 3, 5, 13, 14, 15, 17 (all w/o standard dev.) | 1.0 |
| 5-3 | Binomial Probability Distributions | | # 3, 7, 8, 9-19 odd, 25-28 all, 33, 39 |
| 5-4 | Parameters for Binomial Distributions | | # 1, 4, 5, 7, 11, 18 |
| 6 | 6-2 | Standard Normal Distribution | | # 1-39 odd, 41-43 all, 45, 46, 47 | 2.0 |
| 6-3 | Applications of Normal Distributions | | # 1-19 odd, 25, 38 |
| 6-4 | Sampling Distributions and Estimators | | # 4, 6, 11, 15 |
| 6-5 | The Central Limit Theorem | | # 1, 3, 5, 11, 15, 17 |
| 7 | 7-2 | Estimating a Population Proportion | | # 1-15 odd, 21, 23, 30, 35, 37 | 1.5 |
| 7-3 | Estimating a Population Mean (Part 1 only) | | # 1-17 all |
| 8 | 8-2 | Basics of Hypothesis Testing | | # 1, 3, 4, 5, 7, 9, 11, 13, 16, 17-33 odd | 1.5 |
| 8-3 | Testing a Claim about a Proportion | | # 2, 3, 4, 5, 7, 12, 18, 20, 25 |
| 8-4 | Testing a Claim about a Mean | | # 1-19 odd |
| 9 | 9-2 | Two Proportions | | # 1-10 all, 15, 16 | 1.5 |
| 9-3 | Two Means: Independent Samples | | # 1-5 all, 11, 13, 14, 18 |
| 9-4 | Two Dependent Samples: Matched Pairs | | # 1-13 odd |
| 10 | 10-2 | Correlation | | # 3, 5, 6, 8, 13, 15, 20, 24 | 1.5 |
| 10-3 | Regression | | #1-18 odd, 20 |
| 11 | 11-2 | Goodness-of-Fit | | # 1-4 all, 7, 11, 18 | 1.0 |
| 12 | 12-2 | One-Way-ANOVA (optional) | | #1-4 all, 5, 7, 9, 11, 13 |  |

This syllabus may be changed with notification to the class.