**CCBC, Spring 2019 School of Mathematics and Science**

**Math 153, Introduction to Statistical Methods, ES1 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, chi-square distribution, and ANOVA. A statistical computer package such as StatCrunch, etc. is introduced as a computational tool and integrated throughout the course.

**Prerequisites:** MATH 082 or sufficient math placement score; and ACLT 052 or ACLT 053 or (ESOL 052 and ESOL 054)

1. Basic Course Information
	1. Instructor: Anthony Calise
	2. Office number: MASH 301

Phone number: 410-215-7694

Email address: acalise2@bcps.org

Response Time: If you do not get an e-mail response within 24 hours please email again.

WEBSITE: [www.mrcalise.com](http://www.mrcalise.com)

* 1. Instructor's office hours: MW 6:20-7:20
	2. Mathematics Department Phone Number (Essex): 443-840-2662
	3. Class meeting day(s), time(s) and location(s): Essex MASH 212
	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* – Fundamentals of Statistics, 5th edition, by Michael Sullivan III, Pearson publishing company. It is offered as a 3-hole punch text packaged with MyStatLab which includes access to StatCrunch for homework assignments (ISBN – 9780134763699).

MyStatLab ID: calise91315

* + 1. *Software and supplies*: StatCrunch is used to demonstrate statistical concepts. You can access StatCrunch from a MyStatLab account or can purchase 6 months access to StatCrunch for $13.75 at <http://www.statcrunch.com/get-access/>
1. Course Goals Overall
2. 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. summarize data in a contingency table;
7. identify association among qualitative variables using conditional distribution;
8. compare and contrast research of data from diverse cultural and global populations;
9. construct and interpret probability models for discrete random variables;
10. solve a normal probability distribution application;
11. apply the fundamentals of probability in application;
12. construct and interpret confidence intervals in order to make inferences about parameters;
13. perform hypothesis testing to draw inferences regarding parameters;
14. perform a test of independence using the chi-square distribution;
15. solve problems involving one-way analysis of variance;
16. construct a solution to real world problems using problem methods individually and in teams;
17. examine the mathematical/statistical contributions made by people from diverse cultures locally, globally, and throughout history;
18. identify and critically evaluate the ethical issues at stake in individual and collective decisions;
19. effectively communicate the results of a statistical analysis;
20. apply statistical methods to data from diverse cultural and global populations; and
21. find, evaluate, use, and cite appropriate academic resources when completing written assignments.
22. Major Topics as listed on the official Common Course Outline
23. Review
24. Organizing data
25. Descriptive measures
26. Sampling Techniques
27. Managing Grouped Data
28. Probability
	1. Fundamentals and basic concepts
	2. Addition rule
	3. Multiplication rule
	4. Conditional probability
29. 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
30. Normal Distribution
	1. Characteristics of the normal distribution
	2. Use and interpret normal probabilities
31. Sampling Distributions
	1. Central Limit Theorem (CLT)
	2. Mean and standard error
	3. Apply CLT in application
32. Estimates and Confidence Intervals
	1. Introduction to the t-distribution
	2. Confidence interval for a population mean
	3. Confidence interval for a population proportion
33. 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
34. Regression and Correlation
	1. Scatter plot
	2. Use and interpret the correlation coefficient
	3. Use and interpret the linear regression
	4. Contingency tables and association
35. Chi-Square Distribution: Test of Independence
36. Comparing Three or More Means: One -Way Analysis Of Variance (ANOVA)
37. 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: 2 Projects, 4 Exams, 4 Quizzes/HW’s, Final Exam
	2. Instructor’s grading policy
2. Test(s) 40 % of course grade
3. Final Exam 30 % of course grade
4. Projects 20% of course grade
5. HW/Quizzes 10% of course grade

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| **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. Class Website: [www.mrcalise.com](http://www.mrcalise.com)
	2. 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).”

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 Catonsville coordinator, Tejan Tingling, at 443-840-2631 or ttingling@ccbcmd.edu

* 1. Other material related to Course Procedures
	2. Course Academic Calendar and final exam schedule: <http://www.ccbcmd.edu/Resources-for-Students/Registering-for-Classes/Academic-Calendar.aspx>
	3. Final exam for this course is scheduled for 5/15 at 7:30 – 9:30.

Tentative Homework List based on *Fundamentals of Statistics,* 5 ed. by M. Sullivan

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| Ch. | Sections | Suggested Practice | Weeks |
| 1 | 1.1 Introduction to the Practice of Statistics  | 1 - 6, 7-51 odd | Max 1.5 |
| 1.2 Observational Studies versus Designed Experiments  | 1 – 8, 9 - 21 odd |
| 1.3 Review Simple Random Sampling  | 1 - 4, 5 - 11 odd |
| 1.4 Review Other Effective Sampling Methods  | 1 – 5, 7 - 25 odd |
| 1.5 Review Bias in Sampling | 1 – 4, 5 - 19 odd |
| 1.6 Review The Design of Experiments  | 1 – 4, 5- 13 odd |
| 2 | 2.1 Review Organizing Qualitative Data  | 1 – 4, 5 - 13 odd, 19, 21, 23, 29 |
| 2.2 Review Organizing Quantitative Data | 1 – 4, 5 – 11 odd, 17 – 27, odd, 33 – 41 odd |
| 2.3 Review Graphical Misrepresentations of Data | 1 - 15 odd |
| 3 | 3.1 Review Measures of Central Tendency  | 1-17 odd, 18, 21, 23-25, 27, 45, 48 |
| 3.2 Measures of Dispersion  | 1-4, 5, 7, 11, 14, 19, 21, 28, 29, 33, 35, 42 |
| 3.3 Measures of Central Tendency and Dispersion from Grouped Data  | 1, 3, 5, 9, 10, 11, 14 |
| 3.4 Measures of Position and Outliers  | 1-4, 5-11 odd, 16, 17, 21-25 odd |
| 3.5 Review The Five-Number Summary and Boxplots | 1-6, 9, 15, 16, 20 |
| 4 | 4.1 Scatter Diagrams and Correlation  | 1 – 8, 9 - 29 odd | 1.5 |
| 4.2 Least-Squares Regression | 1 – 4, 5 – 21 odd |
| 4.3 The Coefficient of Determination (optional) | 1, 4, 5 – 15 odd |
| 4.4 Contingency tables and Association | 7 – 13 0dd |
| 5 | 5.1 Probability Rules  | 1 – 6, 7 – 37 odd | 1.0 |
| 5.2 The Addition Rule and Complements | 1 – 24, 27 -37 odd |
| 5.3 Independence and the Multiplication Rule  | 1 - 6, 7 – 27 odd |
| 5.4 Conditional Probability and the General Multiplication Rule | 1 – 10, 11 – 27 odd |
| 5.6 Putting It Together: Which Method Do I Use? (optional) | 2 – 9, 13 – 17, 21, 25, 27 |
| 6 | 6.1 Discrete Random Variables  | 1 –4, 5 – 25 odd | 1.0 |
| 6.2 The Binomial Probability Distribution | 1 – 6, 7 – 43 odd |
| 7 | 7.1 Properties of the Normal Distribution  | 1 – 6, 7 – 37 odd | 1.0 |
| 7.2 Applications of the Normal Distribution | 1 - 4, 5 - 47 odd |
| 7.3 Assessing Normality (optional) | 1, 1, 3 – 11 odd |
| 8 | 8.1 Distribution of the Sample Mean  | 1 – 8, 9 – 31 odd | 1.0 |
| 8.2 Distribution of the Sample Proportion | 1 – 5, 7 – 27 odd |
| 9 | 9.1 Estimating a Population Proportion | 1 - 6, 7 - 41 odd | 1.5 |
| 9.2 Estimating a Population Mean | 1 - 5, 7 - 25 odd, 29 – 43 odd |
| 9.3 Putting It Together: Which Method Do I Use? (optional) | 1 –4, 5 – 19 odd |
| 10 | 10.1 The Language of Hypothesis Testing  | 1 – 8, 9, 13, 17, 21, 25, 29, 35 – 39 odd | 1.5 |
| 10.2 Hypothesis Tests for a Population Proportion | 1 – 6, 7 – 31 odd |
| 10.3 Hypothesis Tests for a Population Mean | 1 – 25 odd |
| 10.4 Putting It Together: Which Method Do I Use? (optional) | 1 – 15 odd |
| 11 | 11.1 Inference about Two Population Proportions  | 1, 2, 3 - 21 odd | 1.5 |
| 11.2 Inference about Two Means: Dependent Samples  | 1, 2, 3 – 15 odd |
| 11.3 Inference about Two Means: Independent Samples | 1 – 19 odd |
| 11.4 Putting It Together: Which Method Do I Use? (optional) | 1 – 17 odd |
| 12 | 12.2 Test of Independence | 1 – 17 odd | 0.5 |
| 13 | 13.1 One-Way-ANOVA - Extra Resource | 15, 17, 19, 25 | 1.0 |

This syllabus may be changed with notification to the class.