MATH 4420
Probability and Statistics II

Course description: Statistical models; Point estimation; Interval estimation; Testing statistical hypothesis; Goodness-of-fit tests.

Mathematical Prerequisites: C or better in MATH 4410.

Textbook: *An Introduction to Mathematical Statistics and Its Applications*, 5th edition, Richard Larsen and Morris Marx, Pearson.

Topic covered: This course will cover Chapter 5, Chapter 6, Chapter 9, Chapter 10, The contents of these chapters will be covered are:

Chapter 5 Estimation
Estimating Parameters: The Method of Maximum Likelihood and the Method of Moments. Interval Estimation. Properties of Estimators. Minimum-Variance Estimators: The Cramer-Rao Lower Bound. Sufficiency. Consistency.

Chapter 6 Hypothesis Testing
The Decision Rule. Testing Binomial data. Type I and Type II Errors. A Notion of Optimality: The Generalized Likelihood Ratio.

Chapter 7 The Normal Distribution
Drawing the inferences about the population mean Drawing the inferences of population variance.

Chapter 9 Two-Sample Problems
Two-sample t Test of two means. The F test about two standard deviations. Testing of Binomial data. Confidence intervals for the Two-sample problems.

Chapter 10 Goodness-of-Fit Tests
The Multinomial Distribution. Goodness-of-Fit Tests: All Parameters known. Goodness-of-Fit: Parameters unknown. Contingency Tables.

Homework: Homework will be assigned in the class and collected one week after the lecture. Please staple the pages of each assignment together and list your name on the first page.

Midterm Exams: Two midterm exams will be given during the lecture times. The exam dates will be announced in the class at least two weeks in advance.

Final Exam: The final exam will be comprehensive which covers all the chapters lectured during the whole semester.

Make-up Exams: Make-up exams will be given only in very exceptional situations. The student must convince the instructor that there is a very good reason for missing the exam. Proofs such as doctor's proofs may be asked for if necessary.

Grading:
Homework: 15%
Test 1: 25%
Test 2: 25%
Final: 35%

Grading Scale:
A 90%--100%
B 80%--89.9%
C 70%--79.9%
D 60%--69.9%
F 0%--59.9%

Teaching Methods: The instructor will integrate teaching strategies including but not limited to: lecture, large and small group discussion, cooperative learning, case studies, internet and video. Throughout this course, students will be expected to work independently and in groups to learn about statistics.

Expectations of Behaviors: The important factors of student success are attendance and participation. While few students might find it possible to succeed without regular attendance, most students will find that regular attendance is necessary for success in this course. This does not mean that regular attendance will lead success automatically. You have to learn the content of the course. All students should: (a) make regular course attendance a priority, (b) devoting significant amount of time to studying for this course, (c) complete all the course assignments on time, and (d) participate in this course actively.

For this course to be effective, students must be active participants. You are expected to contribute to each class session in various way including but not limited to: asking questions, answering other questions, and adding relevant information. The more spontaneous you can be with your contributions, the more efficient the class is.

Treat each other with respect and dignity. There are things we all can learn from each other. This means allowing everyone to share their ideas and carefully considering their inputs. No one should ever be put down for his/her contributions.

Codes of Conduct and Academic Honestly Policy: The instructor and students in this course will adhere to the University's general Codes of Conduct defined in the BGSU Student Handbook. The Codes of Academic Conduct (Academic Honesty Policy) requires that students do not engage in academic dishonesty. For details, refer to: ***Student Discipline Programs.***

Department Mediator: Dr. Kit Chan, 415 Msc , 419-372-7468.
If a student has a problem with this course, the student should discuss with the instructor. If the problem persists or is unresolved, the student should then contact the course coordinator Dr. Diem Nguyen (dnguyen@bgsu.edu). If the problem is still unresolved, the student should finally contract the department mediator.

Dropping the Course: During the first 14 calendar days of the semester, students may drop this course with no record on their transcripts. After the second week, students must follow the formal withdraw policy. It is the student's responsibility to obtain the Add/Drop form and submit it to the appropriate University office.

BGSU Learning Commons: http://www.bgsu.edu/learning-commons.html
As one of additional resources, BGSU learning commons offers tutoring to various levels of undergraduate courses which is a free service for all BGSU students enrolled in any courses at BGSU. The Learning Commons is located on the first floor of Jerome Library. In addition to tutoring, the center also offers resources such as textbooks, computers and calculators. For this semester's hours of operation, please visit their website.

Technology Support Center (TSC): provides a central point of contact for faculty, staff and students for questions, problems reports, service requests and inquires for University computer systems and communications technologies at BGSU. Email: tsc@bgsu.edu. Phone 419-372-0999.

Disability Policy: In accordance with the University policy, if the student has a documented disability and required accommodations to obtain equal access in this course, he/she should contact the instructor at the beginning of the semester and make this need known. Students with disabilities must verify their eligibility through ***the Office of Disability Services for Students***. Phone 419-372-8495.

Religious Holidays: It is the policy of the University to make every reasonable effort to allow students to observe their religious holidays without academic penalty. In such cases, it is the obligation of the student to provide instructor with reasonable notice of the dates of religious holidays on which he/she will be absent. Absence from classes or exams for religious reasons does not relieve the student of responsibility for completing required work missed. Following the necessary notification, the students

should consult with the instructor to determine what appropriate alternative opportunity will be provided, allowing the student to fully complete his/her academic responsibilities.

Course Learning Outcomes:

1. How to estimate parameters with different methods.
2. How to perform the hypothesis testing.
3. How to perform a two-sample test
4. How to perform the goodness-of-fit tests

BGP Quantitative Literacy Learning Outcomes:

1. Interpret mathematical models such as formulas, graphs and schematics, and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically and verbally.
3. Use arithmetical, algebraic and geometric methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives and select optimal results.
5. Recognize that mathematical methods are based on assumptions and have limits.