I. Course Description

Analytics is the discovery and communication of meaningful patterns in data. This course will provide students with an analytics toolkit, covering concepts in probability and statistics while emphasizing the value and pitfalls of reasoning with data. Applications will focus on connections among analytical tools, data, and business decision-making.

The two main objectives of the course are to (i) introduce probability concepts that directly impact managers’ decision making skills in uncertain environments, and (ii) introduce statistical concepts that lay the foundation for data analysis done in Business Analytics II (DECS 431).

Students with a solid background in probability, statistics, and data work may prefer to waive DECS 430-5. Waiver exams will be given according to the Kellogg waiver exam schedule, communicated via Kellogg administration.

II. Assignments and Assessment

The deliverables for the course are the following.

**Homework Assignments** – A homework assignment is given after each of the first four class sessions, and is to be completed prior to the next class session. Each assignment is worth 10% of the course grade (total 40%). Assignments #1 and #4 are GROUP assignments. Group membership will be randomly determined and posted to the course website. Assignments #2 and #3 are INDIVIDUAL assignments.

**Final Exam** – A final exam will be offered after the completion of the five sessions. Specific timing and deadlines will be provided at a later time. The final exam is worth 60% of the course grade.
III. Classroom Etiquette, Honor Code, etc.

The current learning environment is new to both students and faculty. With that in mind, specific norms and expectations for classroom etiquette are likely to evolve as we adjust our processes over time. Students are expected to meet the high standards of classroom etiquette that we have at Kellogg. Kellogg’s Honor Code and Code of Student Etiquette applies at all times; students should feel free to ask the instructor whenever any ambiguity is perceived in these policies. Students should be ready to begin class on time.

IV. Course materials

Materials for the course are distributed via Canvas. There is no required textbook for the course. For students who find it beneficial to have an additional source of material for reference, we suggest the optional textbook "Vital Statistics: Statistics for Business and Economics", by William Sandholm and Brett Saraniti, Oxford Univ. Press. Note that some of our classroom examples are taken from this text.

V. Communications and other items

- Direct email is the most reliable form of contact for me. I return messages ASAP. (Messaging through Canvas can be a bit clunky.)
- The course website will contain all course materials. If an incomplete slide deck is distributed before a class (to avoid spoiling a discussion), the complete slide deck will be posted after class for your review.
- (Optional) TA review sessions will be scheduled for students needing additional review of concepts. An announcement of times/locations will be made.
VI. Course Outline

Session 1
Introduction and the Basics
• Data and Organizational Decision-Making
• Descriptive Statistics
• Rules of Probability
• Interpreting and Recognizing Conditional Probability

Session 2
Independence I
• Random Variables
• Expected Value, Variance
• Probability Distributions
• The Portfolio Problem

Session 3
Independence II
• Correlation and Covariance
• Business Applications of the Central Limit Theorem

Session 4
Sampling I
• Inferential Statistics
• Sample Size
• Hypothesis Testing
• Confidence Intervals

Session 5
Sampling II
• Sample Bias
• Adverse Selection
• Wrap-up, Summary and Review (bring your questions!)

Session 6
Exam