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 listed below:

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

Final Exam – Students will take the final exam on Thursday, September 19th. The final exam is worth 60% of the course grade.
III. **Classroom Etiquette, Honor Code, etc.:**

Due to the nature of this course, students will occasionally need to have access to their laptops or tablets during class. However, students should not use these devices for anything other than class work and no electronic devices should be in operation during class time. Students requesting exceptions should contact the professor prior to the first class.

Classes will start promptly, and each student is expected to be prepared to begin at that time. Once class begins, you may leave the classroom only in case of an emergency. There will be a short break near the mid-point of each class session.

Students are expected to abide by Kellogg’s Honor Code and Code of Student Etiquette at all times. Specific guidance on Honor Code issues will be provided during the quarter, as needed.

IV. **Communications and other items:**

- Email is the best way to reach me if you have a question about the course, homework assignments, etc. I will get back to you ASAP.
- The course website will contain announcements, readings, course materials, etc. It will be updated after every class. In particular, complete slides from each class session will be posted before class for notetaking & review.
- If you would like to meet with me, please let me know. (If you like, you should feel free to propose a meeting time by sending me a meeting request via Outlook. If I cannot make that time, I will simply let you know, and we will work out another time.)
- Optional TA review sessions will be held for students needing additional review of concepts. An announcement of times/locations will be made.
- Cell Phone for DECS Emergencies: (808) 258-7701
V. Course Materials

All course materials will be distributed via the canvas online learning system. There is a VERY OPTIONAL textbook available at the bookstore with further readings, sample problems, and a much more technical analysis of the mathematical elements of the course.

Vital Statistics, Sandholm et. al.

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The appropriate readings and extended coverage for each session are noted in the schedule below. The handful of these readings labelled “VERY ADVANCED” are for those with mathematical backgrounds who want a deep read on the topics and are NOT required for this course.

VI. Schedule:

Session 1
Friday September 7th

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

Textbook Readings
• Chapter 2: Sections 1-5. pp 11-37.

Session 2
Tuesday September 12th

Random Variables & Their Traits
• Random Variables
• Expected Value, Variance
• Probability Distributions
• The Portfolio Problem

Textbook Readings
• Chapter 3: Sections 1-4. pp 53-74
Session 3
Friday September 14th

Independence, Gauss, and the CLT
- Correlation and Covariance
- Business Applications of the Central Limit Theorem

Textbook Readings
- Chapter 4: Sections 1-3. pp 83-99
- Chapter 6: Sections 1-4. pp 151-177
- VERY ADVANCED Chapter 4: Sections 4-4A. pp 99-115
- VERY ADVANCED Chapter 7: Sections 1-6. pp 199-226

Session 4
Monday September 17th

Sampling Distributions
- Inferential Statistics
- Sample Size
- Hypothesis Testing
- Confidence Intervals

Textbook Readings
- Chapter 14: Sections 3-4. pp 399-410
- Chapter 15: Sections 1-2,4-5. pp 427-438,440-450
- Chapter 16: Sections 1-8. pp 459-503
- Chapter 17: Sections 1-4. pp 513-527

Session 5
Tuesday September 18th

Sampling Issues
- Sample Bias
- Adverse Selection
- Wrap-up, Summary and Review (bring your questions!)

Textbook Readings
- Chapter 10: Sections 1-5. pp 299-308