Comprehensive Course Syllabus

Statistical Experimentation and Inference

Course Description:
This course provides college-level work in statistics. It will engage students in the major concepts and tools for collecting, analyzing, and drawing conclusions from data. It will emphasize sound statistical thinking rather than routine procedures and prepare students to take the Advanced Placement exam in Statistics.

INSTRUCTOR:

- Dr. Janice Krouse
- Mathematics office: A-157
  Hours: By appointment
- Telephone number(s): 630-907-5964
- Email address: krouse@imsa.edu

Meeting Days, Time and Room(s)

- Section 1: 1:20 PM to 2:15 PM in A152

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Text(s) / Materials:
Bock, David E., Paul F. Velleman and Richard D. DeVeaux. *Stats: Modeling the World (4th Ed.)* Boston: Pearson/Addison-Wesley, 2015.
TI-89 or TI-84 Calculator with Stat/List Editor.
Fathom Software , R-Studio

Essential Content:
Identify the disciplinary learning standards that will be addressed in this course. Specify by subset wherever possible. That is, each academic/programmatic area has between 7 and 16 specific learning standards, each with further specific aspects. Include both the broad learning standard and the specific aspects which the course will address. See IMSA Core Curriculum Template for models.

SSLs and Outcomes:
Identify the targeted SSL(s) and outcomes that will be addressed in this course. Specify by subset. Again, see IMSA core Curriculum Template for models.

Instructional Design and Approach:
In what specific ways will this course engineer student engagement? In what specific ways will this course further personalization? How is at least one of the core competency design principles for problem-centered, inquiry-based, integrative student learning experiences central to the design and implementation of this course? Consult IMSA Core Curriculum Template for guidelines noted in Essential Experiential Aspect.

Student Expectations:

This course will be very different from your other mathematics courses. It will always be grounded in analyzing a real world situation. As such, "The best thing about being a statistician is that you get to play in everyone else's backyard." The course is intended to be an interactive, thought provoking experience which allows you to construct your own understanding of the concepts and techniques of statistics. You will be forced to think at a higher level. It will affect the way you think and view the world on a daily basis. The goal of the course is to teach you to think carefully about collecting and analyzing data. It is not my intent to lecture you, but to facilitate your learning and guide your explorations and activities. You will be expected to be actively engaged in the class both in our activities and our projects. You will learn that as important as it is to collect and analyze data correctly it is equally important to communicate you results concisely accurately and using the correct vocabulary. Reading, writing and interpretation will be as important as the use and implementation of mathematical calculations.

Assessment Practices, Procedures, and Processes:

In addition to problems assigned in your textbook you will be involved in activities, explorations and projects. You will be expected to read the chapters before class so that we can devote our time to discussion, investigations and activities. There will be approximately three small projects each quarter. You will do these in small groups. Tests will be given after each unit. They may also contain questions from previously studied material.

Sequence of Topics and Activities

Identify the sequence of topics the course will address and any special activities such as field trips, student presentations, etc., included in the sequence. Provide an estimate of time allotted for each topic. A calendar which incorporates the sequence of topics, activities, and major assessments and assignments is strongly recommended.

Weeks 1 and 2
Random Variables (Chapter 15)
Probability Models (Chapter 16)

Unit V: Inference for Proportions
BVD Chapters: 17-21
Time Frame: Weeks 3-7

Week 3
• Sampling distributions and Central Limit Theorem (Chapter 17)

Weeks 4 and 5
• Confidence intervals for one proportion (Chapter 18)

Weeks 5 and 6
• Hypothesis testing for one proportion (Chapter 19)
• Type I and II errors and power (Chapter 20)
Project: Chapter 19 Investigative Task from Teachers' Resource Guide

Week 7
• Intervals and tests for two proportions (Chapter 21)
• Review and Assessment
Unit Assessment: A Part V Test, consisting of both multiple choice and free response questions.

Unit VI: Inference for Means
BVD Chapters: 22-24
Time Frame: Weeks 8-10

Week 8
• Confidence intervals and hypothesis tests for one mean (Chapter 22)
Project: Chapter 22 Investigative Task from Teachers' Resource Guide

Week 9
• Confidence intervals and hypothesis testing for two means (Chapter 23)
• Confidence intervals and hypothesis testing for matched pairs (Chapter 24)
Project: Chapter 24 Investigative Task from Teachers' Resource Guide

Week 10
• Cumulative review and Assessment

Group inference project: cumulative inference for proportions and means from Teachers Resource Guide
Unit Assessment: A Part VI Test, consisting of both multiple choice and free response questions covering inference for both means and proportions (Units V and VI).

Unit VII: Inference for Counts and Slope
BVD Chapters: 25-26
Time Frame: Weeks 11-12

Week 11
• Chi-square goodness-of-fit test (Chapter 25)
• Chi-square for homogeneity and for independence (Chapter 25)
Project: Chapter 25 Investigative Task

Week 12
• Confidence interval for slope (Chapter 26)
• Hypothesis testing for slope (Chapter 26)
• Cumulative review and assessment
Unit Assessment: A Part VII Test, consisting of both multiple choice and free response questions covering all inference topics (Units V, VI, and VII).

Review for the AP Exam
Time Frame: Weeks 13-14
• Practice Free Response problems will be used extensively
• Practice work from the AP Test Prep review book
Assessment:.
• A practice exam(s) will be given.

Post AP Exam (weeks 15-16): Student Projects completed and presented.