Agenda Item #16-23R
Effective Fall 2016

Eastern Illinois University
Revised Course Proposal
MAT 2250G, Elementary Statistics

Banner/Catalog Information (Coversheet)

1. **____New Course or __x___Revision of Existing Course**
2. **Course prefix and number:** MAT 2250G
3. **Short title:** Elementary Statistics
4. **Long title:** Elementary Statistics
5. **Hours per week:** _4__ Class __0_ Lab _4__ Credit
6. **Terms:** _x__ Fall _x__ Spring _x_ Summer ___ On demand
7. **Initial term**: _x_ Fall ___ Spring ___ Summer Year: 2016

Catalog course description: Descriptive and inferential statistics including measures of central tendency and dispersion, confidence intervals, and hypothesis testing. Recommended as a first course in statistics. Not open to mathematics majors. M1 902

8. **Course attributes:**

   General education component: ___Mathematics_____

   ___ Cultural diversity ___ Honors ___ Writing centered ___ Writing intensive ___Writing active

9. **Instructional delivery**

   Type of Course:

   _x__ Lecture ___ Lab ___ Lecture/lab combined ___ Independent study/research

   ___ Internship ___ Performance ___ Practicum/clinical ___ Other, specify: __online course__

   Mode(s) of Delivery:

   _x__ Face to Face _x__ Online ___ Study Abroad

   ___ Hybrid, specify approximate amount of on-line and face-to-face instruction_____

10. Course(s) to be deleted from the catalog once this course is approved. _____None_____
11. **Equivalent course(s):** __None_____

    a. **Are students allowed to take equivalent course(s) for credit?** ___ Yes _x__ No

12. **Prerequisite(s):** MAT 1270, or placement by department guidelines.

    a. **Can prerequisite be taken concurrently?** ___ Yes _ x_ No

    b. Minimum grade required for the prerequisite course(s)? _C _

    c. **Use Banner coding to enforce prerequisite course(s)?** _ x_ Yes ___ No

d. **Who may waive prerequisite(s)?**

___ No one _x__ Chair ___ Instructor ___ Advisor ___ Other (specify)

13. Co-requisite(s): None

14. Enrollment restrictions

a. **Degrees, colleges, majors, levels, classes which <u>may</u> take the course:** Open to all students except Math majors.

b. **Degrees, colleges, majors, levels, classes which may <u>not</u> take the course:** This course is not open to Math majors.

15. Repeat status: _x__ May not be repeated ___ May be repeated once with credit

16. Enter the limit, if any, on hours which may be applied to a major or minor: ___

17. Grading methods: _x__ Standard ___ CR/NC __ Audit ___ ABC/NC

18. Special grading provisions:

___ Grade for course will <u>not</u> count in a student's grade point average.

___ Grade for course will <u>not</u> count in hours toward graduation.

___ Grade for course will be removed from GPA if student already has credit for or is registered in: _____

___ Credit hours for course will be removed from student's hours toward graduation if student already has credit for or is registered in: _____

19. Additional costs to students:

Supplemental Materials or Software__<u>Webassign Access</u>_and <u>TI-83/84 Calculator</u>____

Course Fee _<u>x</u>_No ___Yes, Explain if yes_____

20. Community college transfer:

_x__ A community college course may be judged equivalent.

___ A community college may <u>not</u> be judged equivalent.

Note: Upper division credit (3000+) will <u>not</u> be granted for a community college course, even if the content is judged to be equivalent.

Rationale, Justifications, and Assurances (Part I)

1. _x__Course is required for the major(s) of _ Department of Nursing, Business Education, Biological Sciences with Teacher Certification, and Dietetics program of Family and Consumer Science. This course may also be used by Elementary Education majors to meet state mandated mathematics requirements.

   ___Course is required for the minor(s) of _____

   ___Course is required for the certificate program(s) of _____

   ___ Course is used as an elective

2. **Rationale for proposal**: This course is a revision of the existing MAT 2250G course. The goal is to update the course language and allow for online delivery. The possibility of online delivery provides for added scheduling flexibility for our undergraduate students.

3. **Justifications for (answer N/A if not applicable)**

   Similarity to other courses: N/A

   Prerequisites: This course requires basic knowledge of linear equations and inequalities. Additionally, familiarity with the function concept and how to graph them is needed. These are topics covered in nearly any intermediate algebra course (MAT 1270). In a survey of several other state institutions, it was found that MAT 1270 or its equivalent is the prerequisite for similar courses.

   Co-requisites: N/A

   Enrollment restrictions: Mathematics majors are already required to take MAT 3701 – Probability and Statistics I and MAT 3702 – Probability and Statistics II. These courses deal with some of the same (but not all) content as MAT 2250G, but from a calculus-based perspective.

   Writing active, intensive, centered: N/A

4. **General education assurances (answer N/A if not applicable)**

   General education component:

   Critical Thinking – Students will

   - Create and interpret data charts and graphs (CT-1)
   - Choose and apply appropriate statistical techniques for analyzing real-world problems (CT-2)
   - Interpret formulas and statistical quantities (CT-3)
   - Become aware of method appropriateness, assumptions, biases, and justifiable conclusions (CT-4)

Writing and Critical Reading – Students will

- Analyze bar graphs, histograms, pie charts, and other statistical representation of data (WR-1)
- Interpret and clearly state the conclusion of statistical tests (WR-2)
- Improve their statistical literacy by understanding terminology, statistical methods, and the appropriate conditions for the use of different processes (WR-3)

Speaking and Listening – Students will N/A

Quantitative Reasoning – Students will

- Calculate and measure a variety of attributes using technological tools (QR-1)
- Solve problems using appropriate statistical methods, assumptions, propositions, formulas, propositions, and theorems (QR-2)
- Produce and use different representations of statistical ideas and do so using technological tools (QR-3)
- Read, experience, and analyze data (QR-4)

Responsible Citizenship – Students will

- Learn the social implications of statistical statements (RC-1)
- Understand the importance of ethically reporting the conclusions of statistical tests (RC-2)

Curriculum: The curriculum of the course is centered on topics in elementary statistics that are both relevant to students of all backgrounds and academic goals and also attempt to extend understanding of basic mathematical concepts learned in high school. To that end, the curriculum is based on investigation and non-passive engagement with course topics. The book/ebook adopted for the course comes with an activities and explorations manual. Critical thinking and quantitative literacy are well represented in the curriculum through these explorations and activities. Additional learning goals are reflected in the work and explanations required for course activities.

Instruction: The instructional philosophy of the course is somewhat driven by general education goals which include a set of mathematical practices. The mathematical practices are a set of tools for teaching and learning mathematics content and appear to be closely related to the general education learning goals. The mathematical practices are – (a) make sense of problems and persevere in solving them, (b) reason abstractly and quantitatively, (c) construct viable arguments and critique the reasoning of others, (d) model with mathematics, (e) Use appropriate tools strategically, (f) attend to precision, (g) look for and make use of structure, and (h) look for and express regularity in repeated reasoning.

Assessment: Assessments will mostly reflect the quantitative literacy and critical thinking learning goals through standard types of problems and problem solving activities one might expect in a mathematics class.

5. Online/Hybrid delivery justification & assurances (answer N/A if not applicable)

Online or hybrid delivery justification: The Department of Nursing offers almost all of its courses as online courses; one of the few exceptions being MAT 2250. Offering Elementary

Statistics online will fill in the much-needed gap. Also, the online version of MAT 2250G will allow for greater scheduling flexibility.

Instruction: The course will be delivered primarily through D2L enhanced with WebAssign (web-based instruction system). Online sections will be taught by faculty who have completed training for the online course development and pedagogy (OCDI). A primary difference between the online course and the face-to-face course will be the facilitation for discussion. Using a discussion board (both synchronous and asynchronous) faculty and students can engage in discussion that would normally take place in a classroom. Students will also be able to interact with one another and the instructor at times, which are most convenient for them. In person meetings can still be arranged as needed. Delivery of course content through WebAssign allows for resources such as PowerPoint slides, audio recordings, applets, and the virtual textbook, to be available before and after class meetings. Assessments such as homework, quizzes, and exams can also be handled in this way.

Example of Week 8: Population Proportion Confidence Intervals

a) Watch video lecture: https://www.youtube.com/watch?v=3ReWri_jh3M
b) Watch accompanying calculator lecture: https://www.youtube.com/watch?v=np-CwMl-O1M
c) Do the corresponding homework assignment on WebAssign.
d) Class Participation/Discussion Assignment. Find a quarter and toss it 16 times and count the number of Heads that turn up. Report this number. Also construct a 95% Confidence interval, using the methods of this section. Report this Confidence Interval. Use this interval to make a statement about your coin being fair or not.

Integrity: WebAssign attempts to insure the integrity of quizzes and exams by locking the computer down during test time so that no web-browsing is permitted. The webcam takes random snapshots of the student working on the quiz/exam. Also, the integrity of student work will be assured/tested through writing assignments—any break in a signature writing style/voice will be a red flag for the instructor.

Interaction: Instructor-student and student-student interaction will be promoted through a variety of discussion boards—a) Ask your instructor, b) Ask the class, c) Online Office hours, and d) email. Instructors are also available to talk to the students via phone or through on-campus, face-to-face meeting.

Model Syllabus (Part II)

Please include the following information:

1. Course number and title
2. Catalog description
3. Learning objectives.
4. Course materials.
5. Weekly outline of content.
6. Assignments and evaluation, including weights for final course grade.
7. Grading scale.
8. Correlation of learning objectives to assignments and evaluation.

1. Course number and title:

MAT 2250G Elementary Statistics

2. Catalog description:

Description: Descriptive and inferential statistics including measures of central tendency and dispersion, confidence intervals, and hypothesis testing. Not open to mathematics majors.

3. Learning objectives:

Learning Objectives: Students will be able to-
a) Create and interpret data charts and graphs (CT-1, WR-1)
b) Choose and apply appropriate statistical techniques for analyzing solutions to real world problems (CT-2)
c) Understand, interpret, and calculate statistical quantities (CT-3, QR-1)
d) Become aware of method appropriateness, assumptions, biases, and justifiable conclusions (CT-4)
e) Understand and interpret any poll or survey they encounter (RC-3)
f) Perform basic hypothesis tests (QR-2)
g) Learn the social implications of applying correct vs. incorrect statistical tests and techniques (RC-2)

4. Course materials:

Course Materials: *Understandable Statistics, 10th Edition,* by Brase and Brase. Publisher: Brooks Cole.

5. Weekly Outline of Content:

Week 1

Introduction to Statistics

- Basic terminology
- Levels of measurement
- Uses and abuses of statistics
- Types of sampling techniques
- Histograms, pie charts, and frequency tables

Week 2

Descriptive Statistics

- Measures of central tendency
- Measures of dispersion
- Box and whisker plots

Week 3—4

Introduction to Probability

- Fundamentals and definitions
- Multiplication rules and independence
- Conditional probability
- Addition rules
- Counting techniques

Week 5—7

Probability Distributions

- Expected value and standard deviation
- Binomial and Poisson Distributions
- Normal Distribution
- Central Limit Theorem
- Approximating Binomial by Normal

Week 8

Confidence interval and estimating sample size

- Mean (sigma known)
- Mean (sigma unknown)
- Population proportion

Week 9—11

Hypothesis Testing

- Mean (sigma known)
- Mean (sigma unknown)
- Population proportion
- Difference of means and proportions
- Paired differences

Week 12—14

Chi-Square and F-distributions

- Testing variance and standard deviations
- Confidence interval for variance
- Testing two variances
- Tests of Independence and Homogeneity
- Goodness of fit test

Week 15

Regression and Correlation

- Introduction
- Calculation of the Best fit Line
- Interpretations and predictions
- Review

Week 16

Final Exam

6. Assignments and evaluation, including weights for final course grade.

Assignment and Evaluation

- Weekly Quizzes, 10% of the final grade
- Three Exams, ~~45%~~ 50% of the final grade
- Homework, 15% of the final grade
- Final Exam, 15% of the final grade
- Weekly participation, 10% of the final grade. Students will be expected to substantially participate in the online discussion boards. Specific guidelines about satisfactory participation will be provided.

7. Grading Scale

The standard grading scale will be used; A: 90-100%, B: 80-89%, C: 70-79%, D: 60-69%, and F:0-59%

8. Correlation of learning objectives to assignment and evaluation:

	Explorations/Homework (15%)	Quizzes/Tests (60%)	Final Exam (15%)	Online Participation (10%)
Interpret data charts and graphs (CT-1) 3a)	✓	✓	✓	✓
Statistical techniques for analyzing solutions to real world problems (CT-2) 3b)	✓	✓	✓	✓
Understand, interpret, and calculate statistical quantities (CT-3, QR-1) 3c)	✓	✓	✓	✓
Method appropriateness, assumptions, biases, and justifiable conclusions (CT-4) 3d)	✓	✓	✓	✓
Polls and surveys 3e) (RC-3)	✓	✓	✓	✓
Hypothesis testing 3f) (QR-2)	✓	✓	✓	✓
Social implications 3g) (RC-2)	✓			✓

Date approved by the department or school: 1/22/16
Date approved by the college curriculum committee: 2/19/16
Date approved by the Honors Council ***(if this is an honors course):***
Date approved by CAA: 4/7/16 **CGS:** Not applicable