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Action-Date: UW Fee App 11/9/99 Senate App 2/1/00

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Jacqueline Gorman Phone 7-2608

Department Mathematics

II. PROPOSAL TYPE (Check All Appropriate Lines)

X **COURSE** Sem in Prob & Stats
Suggested 20 character title

X New Course* MA 455 Seminar in Teaching Probability and Statistics
Course Number and Full Title

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Rev.

____ Course Revision _____
Course Number and Full Title

____ Liberal Studies Approval+ for new or existing course _____
Course Number and Full Title

____ Course Deletion _____
Course Number and Full Title

____ Number and/or Title Change _____
Old Number and/or Full Old Title

_____
New Number and/or Full New Title

____ Course or Catalog Description Change _____
Course Number and Full Title

_____ **PROGRAM:** ____ Major ____ Minor ____ Track

____ New Program* _____
Program Name

____ Program Revision* _____
Program Name

____ Program Deletion* _____
Program Name

____ Title Change _____
Old Program Name

_____
New Program Name

III. Approvals (signatures and date)

Ann P. Massey
Department Curriculum Committee

Gerald Bunce 3/5/99
Department Chair

John R Johnson Academic Pgms Teacher Prep 5/12/99
College Curriculum Committee

John D. Ed 3/23/99
College Dean

+Director of Liberal Studies (where applicable)

*Provost (where applicable)

MA 455 Syllabus

I. Catalog Description

MA 455 Seminar in Teaching Probability and Statistics — 1 credit, 1 lecture hour, 0 lab hour, (1c-0l-1sh)

Prerequisites: None

Seminars are designed for the pre-student teacher. Students in each class will gain insights into the problems in teaching each topic and become aware of the materials available and methods of instruction geared to the secondary mathematics student. Education majors only.

II. Course Objectives:

The students will explore learning and teaching statistics and probability by

1. developing methods of collecting, organizing, representing and describing data concretely, pictorially, and symbolically.
2. constructing, interpreting, and analyzing graphs.
3. making predictions, generating hypotheses, and developing theories based on given data.
4. using games to compare experimental and theoretical probability.
5. designing appropriate learning activities to teach statistics and probability.
6. presenting lessons and a learning activity.
7. integrating technology to collect, represent, analyze and interpret data.

III. Course Outline

1. Standards

   A. National Council of Teachers of Mathematics Standards for Statistics and Probability (1 week)

   B. Pennsylvania Academic Standards for Statistics and Probability

   C. American Statistics Association Quantitative Literacy Teaching Principles

2. Teaching and Learning

A. Graphs (5 weeks)

i. Line graphs and number line plots

ii. Bar graph and histogram

iii. Circle graph

iv. Glyphs

v. Stem-and-leaf plot

vi. Box-and-whiskers plot

vii. Scatter plot

B. Mean, median, quartiles, and outliers (1 week)

C. Linear regression (1 week)

D. Standard deviation and variance (1 week)

E. Experimental and Theoretical Probability (2 weeks)

F. Projects (2 weeks)

i. Surveys

ii. Experiments

iii. Observational studies

3. Alternative assessment including projects and portfolios (1 week)

IV. Evaluation Methods

The final grade for the course will be determined as follows:

35% Homework, Quizzes, and Class Participation

25% Short Lesson Plans and Presentations

40% Project and Presentation

Grading Scale: 93-100...A; 87-92...B; 75-86...C; 65-74...D; 0-64...F

V. Required textbooks, supplemental books and readings

Textbook: Landwehr, J.M. and Watkins, A.E. Exploring Data. (Teacher's Edition. Palo Alto, CA: Dale Seymour Publications, 1996.

VI. Special resource requirements

Students will be expected to have a graphing calculator.

VII. Bibliography

Barbella, P., Kepner, J., and Scheaffer, R. Exploring Measurements. Palo Alto, CA: Dale Seymour Publications, 1994.

Burrill, G. and Hopfensperger, P. Exploring Linear Relations. Palo Alto, CA: Dale Seymour Publications, 1998.

Burrill, G. et. al. Data Analysis and Statistics. Reston, VA: National Council of Teachers of Mathematics, 1992.

Errthum, E., Schaeffer, R., Mastromatteo, M., and O'Connor, V. Exploring Projects. White Plains, NY: Dale Seymour Publications, 1999.

Gnanadesikan, M., Scheaffer, R. L., and Swift, J. The Art and Techniques of Simulation. Palo Alto, CA: Dale Seymour Publications, 1987.

Landwehr, J. M., Swift, J., and Watkins, A. E. Exploring Surveys and Information from Samples. Palo Alto, CA: Dale Seymour Publications, 1987.

National Council of Teachers of Mathematics. Dealing with Data and Chance. Reston, VA: NCTM, 1992.

Newman, C. M., Obremski, T. E., and Scheaffer, R. L. Exploring Probability. Palo Alto, CA: Dale Seymour Publications, 1987.

Phillips, E., Lappan, G., Winter, M. J., and Fitzgerald, W. Probability. Reading, MA: Addison-Wesley Publishing Company, 1986.

Rossman, A. J. Workshop Statistics: Discovery with Data. New York: Springer, 1996.

Shulte, A. P. Teaching Statistics and Probability: 1981 Yearbook. Reston, VA: NCTM, 1981.

Course Analysis Questionnaire

Section A: Details of the Course

A1 How does this course fit into the programs of the department? For what students is the course designed?

The Mathematics Department currently offers 1-hour seminars in teaching General Mathematics, Algebra, and Geometry for students majoring in Mathematics Education. This course, Seminar in Teaching Probability and Statistics, would provide an additional opportunity for students to develop techniques and materials for integration into the 7-12 curriculum.

A2 Does this course require changes in the content of existing courses or requirements for a program?

This course does not require changes in existing courses or requirements. In fact, we now require that students take two 1-hour teaching seminars and the addition of this course will enable us to rotate four courses instead of three.

A3 Has this course ever been offered at IUP on a trial basis?

This course has been piloted under MA 481.

A4 Is this course to be a dual-level course?

No.

A5 If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student?

The course will only be offered for one (1) credit.

A6 Do other higher education institutions currently offer this course?

No, not as a one-credit teaching seminar.

A7 Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation. Explain why this content cannot be incorporated into an existing course.

The content is not specifically required for teaching certification. However, probability and statistics are presently listed among the Pennsylvania Academic Standards for grades K-12 and are among the standards recommended by the National Council of Teachers of Mathematics. The importance of probability and statistics has increased and there is simply not enought time to incorporate much new material into our existing courses. We have found that mathematics education students not only benefit by taking teaching seminars and learn material by teaching.

Section B: Interdisciplinary Implications

B1 Will this course be taught by one instructor or will there be team teaching?

It will be taught by one instructor.

B2 What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved.

The course will not affect any other department.

B3 Will seats in this course be made available to students in the School of Continuing Education?

Yes, if the student in an education major.

Section C: Implementation

C1 Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedules of current faculty. What will be taught less frequently or in fewer sections to make this possible?

Yes; present faculty resources are adequate. We currently offer a 1-credit teaching seminar each semester. The addition of this course will only provide another choice for students.

C2 What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following: space, equipment, laboratory supplies and other consumable goods, library materials, and travel funds.

SEQuaL (Statistics Education through Quantitative Literacy) has been a large grant funded by Dwight D. Eisenhower funds. Library materials, projects of teachers, etc. are already in the SEPA office housed in the Mathematics Department. We will be making frequent use of these existing materials.

C3 Are any of the resources for this course funded by a grant? If so what provisiions have been made to continue support for this course once the grant has expired?

The materials have already been purchased and are to remain in the department.

C4 How frequently do you expect this course to be offered? Is this particularly designed or restricted to certain seasonal semesters?

The course will be offered every fourth semester; if approved, it will become part of a four course rotation.

C5 How many sections of this course do you anticipate offering in any single semester?

One

C6 How many students do you plan to accommodate in a section of this course? Is this planned number limited by the availablity of any resources? Explain.

We plan to accommodate no more than 25 students in this course. The number is limited by the need for students to make presentations.

C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

We are not aware of any enrollment limits recommended by a professional society.

Section D: Miscellaneous

Include any additional information valuable to those reviewing this new course proposal.

The course is intended to strengthen the students' ability to teach probability and statistics as well as increase their knowledge of probability and statistics.