

Mathematics Department
University of Wisconsin Oshkosh

General Syllabus for
PBIS 188 Problem Based Inquiry Seminar
Modern Mathematics and Its Applications

Course Description:

This course is designed to bring the excitement of contemporary mathematical ideas to the non-specialist and to help develop the capacity to engage in logical thinking and the ability to read mathematical information critically. We will investigate a broad range of mathematical topics that may be encountered in your day-to-day life, including voting systems, fair division, networks, growth and symmetry, and statistics. Many of the mathematical topics that we will consider may be completely new to you. In fact, much of it has only been discovered within the last 20 years! Nevertheless, the course material will be accessible to anyone with an active curiosity, a willingness to work hard, and a decent background in basic algebra. Interesting and deep mathematics often occurs in places where you might least expect it!

As a problem-based inquiry seminar, the course will emphasize processes; the approach will be intuitive and investigative. This is not a lecture-based course, and students are expected to be actively involved in the process of mathematical inquiry, including investigating, questioning, conjecturing, reasoning, and making mathematical arguments.

Prerequisite:

Math 103 with a grade of C or better or placement.

Description of Students Who Take the Course:

PBIS 188 satisfies the University minimum general education mathematics requirement. It is not intended for students whose programs require additional mathematics courses.

General Goals and Objectives for the Course:

This course focuses on critical thinking and active learning. Students will be engaged in problem solving and will come to understand that a “problem” is a situation that is unfamiliar and one for which a solution is not immediately evident. Being stuck is a natural state of problem solving and an essential part of improving thinking.

PBIS courses offer the opportunity to develop the ability to distinguish problem solving and critical thinking from exercises and routine thinking and to identify attitudes and beliefs that are conducive to success in challenging situations (and those which are not). The intent is to provide a strong intellectual experience that will enhance the university experience and form a solid base for life-long learning.

Specifically students will

- collect data, observe patterns, make and verify conjectures
- improve their ability to reason logically
- develop effective written and oral communication skills
- improve skills related to critical thinking, problem solving and creativity
- use and understand symbol systems and quantitative methods
- understand principles of mathematics and the sciences.

Textbook and Other Required Materials Recently Used:

Excursions in Modern Mathematics 6th edition by Peter Tannenbaum & Robert Arnold
PBIS 188 Supplementary Materials by Bullington and Szydlik S.

Specific Course Content:

The following list is a suggested list. Course content may vary by instructor.

The Mathematics of Social Choice

The Mathematics of Voting.

Weighted Voting Systems.

Fair Division.

The Mathematics of Apportionment.

Management Science.

Euler Circuits.

Hamilton Circuits.

The Mathematics of Networks.

The Mathematics of Scheduling.

Growth and Symmetry.

Spiral Growth in Nature: Fibonacci Numbers and the Golden Ratio.

The Mathematics of Population Growth.

Introductory Statistics

Variation by instructor:

Although this course has a common content syllabus across sections and course coordination occurs, teaching methodology and evaluation policies may vary. Evaluation may include quizzes, exams, a comprehensive final, and the collection of homework. In addition, instructors of this course may assign projects and reading and writing assignments.

Students should consult the individual course syllabus for more information.

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