

PBIS 188

Intro to Modern Mathematics & its Applications – Spring 2014

PBIS 188-001 9:10–10:10 MWF Swart 126

This course is designed to bring the excitement of contemporary mathematical ideas to the nonspecialist and to help develop the ability to problem solve and to reason mathematically. We will investigate a broad range of mathematical topics, including voting systems, apportionment, efficient routing, and networks. Many of the mathematical topics we shall consider may be completely new to you. In fact, some 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!

You can learn mathematics *only* by doing it. Therefore, you will be active participants in the learning process in this course. Although I will lecture on some of the material in the course, much of the class will be student-generated, involving cooperative group-work and class discussions.

This is a general education course intended for students whose major program does not require algebra or calculus. It satisfies the University General Education requirement.

Instructor: Steve Szydlik

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Office Hours: My current schedule of office hours can be found at

http://www.uwosh.edu/faculty_staff/szydliks/schedule.htm.

I am available at other times as well. Just ask!

- Texts:**
- *Excursions in Modern Mathematics*, by Peter Tannenbaum (and Robert Arnold). Any of the 3rd-8th editions is fine. Note that the text can be purchased from online booksellers for greatly reduced prices!
 - *PBIS 188* packet, available from the bookstore or online - Bring this to class every day.

Calculator: A scientific calculator is required. It does not need to be fancy.

Course Topics:

Unit 1: What is Mathematics? (supplementary problems)

Unit 2: Mathematics of Social Choice (Topics from Chapters 1-4)

Unit 3: Management Science (Topics from Chapters 5-8)

Assessment

Exams: There are 3 evening exams in the course, held from 6:00–9:00 pm in **Nursing/Education 152** on the following dates: **Thursday, March 6, Tuesday, April 15, Thursday, May 15.**

Each exam will be worth 22% of your total course grade. Arrangements for conflicts due to **University sponsored activities** must be made at least one week in advance.

Attendance: Attendance in this course is required, and will compose 5% of your grade. You will be allowed 2 absences without penalty. For each subsequent absence, you will lose one-half of a percentage point from your attendance grade. Note: arriving late to class or leaving early counts as one-half of a miss. You are expected to be active participants in class every day. Please see the note on the following page.

Quizzes: There will be weekly quizzes on the course material. Missed quizzes cannot be made up, though the lowest quiz/homework grade will be dropped at the end of the semester.

Homework: Extensive homework will be assigned, and I will collect some, but not all, of it. I will post solutions to selected problems by my office door (220 Swart).

Other Coursework: Over the course of the semester, we'll have a few other interesting activities and assignments. On many days, we'll work in groups solving problems, and I'll sometimes have you hand in the results.

In summary, your grade will be determined by the following:

3 exams (22% each)	66%
Quizzes, Homework, Problem Writeups and other class assignments	29%
Attendance	5%
<hr/> Total	<hr/> 100%

Grading Scale: Grades in the course will be assigned according to the following approximate cutoffs:

	Grade -	Grade	Grade +
A	90%	93%	
B	80%	83%	88%
C	70%	73%	78%
D	60%	63%	68%
F	0%		

So, for example, a student earning 92% of the course points will receive an A-, while a student earning 69% of the course points will receive a D+.

On Class Participation

PBIS 188 is a Problem Based Inquiry Seminar. Much of the course will be spent on processes rather than skills or answers and our approach will be intuitive and investigative. Throughout the course, I expect you to be intensely involved in the process of mathematical enquiry, including investigation, questioning, conjecturing, reasoning, and making mathematical arguments.

Mathematics is not a spectator sport! Success in this class requires your active engagement with the problems, and with your fellow students. During the class, you will work in small groups almost every day. These interactions provide opportunities to share your ideas and to ask questions of each other. I expect you to take advantage of these sessions and to build community in the classroom.

We will also have many whole-class discussions during the semester. Certainly, speaking or asking questions during discussions can be nerve-racking, and fear of making a foolish comment might sometimes make you feel inhibited to the point of nonparticipation. I hope that you will become comfortable enough with your colleagues and with the classroom environment so that this does not happen. However, please do not feel that you have to speak up in class in order to gain my approval or to show me that you are a diligent student. It is acceptable to say nothing in a class session and there will be no presumption of failure on your part in such situations (Just make sure that you are actively engaging with the problems!) *I do not equate silence with mental inertia.* When you have an insight on a topic, a question, a clarification, or even the germ of an idea, I want you to feel free offer your contributions to the class, but I don't want you to do this just for the sake of appearances. In some cases, we might have prolonged periods of silence that might or might not be broken, and we should feel comfortable with that. When you feel like saying something, just speak up.

What Will You Get from this Course?

PBIS 188 is a mathematics course, and you can expect that you will be exposed to many new mathematical ideas this semester. When you finish the course, I expect you to understand this mathematical content. However, from a broader perspective, I also expect you to gain a better understanding of what mathematics is *about* and how we actually go about *doing mathematics*. With this in mind, the course objectives for PBIS 188 include:

- Understanding how mathematics can be used to solve meaningful problems within the realms of political science, networks, and efficient routing.
- Cultivating your expertise in critical thinking, abstract reasoning, problem solving and creativity.
- Deepening your understanding of what it means to “think mathematically,” and becoming more effective at it.
- Gaining a better understanding of what makes a sound mathematical argument, and strengthening your ability to make such an argument.
- Developing skills associated with the scientific method, including rational inquiry, data collection, analysis, theory formulation, hypothesis testing.

- Continuing to develop effective written and oral communication skills.

Note that the last five objectives, in particular, involve developing intellectual resources that form the heart of a liberal arts education. None of these objectives will be easily met, and in fact, some require a lifetime to master. Nevertheless, I expect you to make great strides this semester towards achieving them!