

Northern Michigan University
Department of Mathematics & Computer Science
MA 501 (50672): Mathematical Representation, Reasoning, and Patterns
MTWR 12:10 – 2:20pm West Science 2810
June 16 – July 10, 2008

Instructor: Dr. Carol Bell
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Office Hours:

I will generally be available just before class. If you must see me outside of that time, please contact me via email to make an appointment. If you must speak with me on the phone, please set up an appointment over email.

Text and Other Course Requirements:

Math Made Visual: Creating Images for Understanding Mathematics, Claudi Alsina & Roger B. Nelsen, The Mathematical Association of America (2006). ISBN 0-88385-746-4

This course uses WebCT (Web Course Tools) so you must have Internet access in order to complete assignments and receive course information. To get to the WebCT log-on screen, go to <http://webct.nmu.edu/webct/entryPageIns.dowebct>. Your user id and password should be the same as your NMU campus email user id and password.

Videoconferencing and Class Videos:

Some of the classes will take place via videoconferencing. If you are not on NMU's campus, you will need to go to DIISD Administration building in Kingsford located at 1074 Pile Drive. Please ask for the ITV room when you arrive. Since videoconferencing is real time, then you must attend during our specified class time, which is 12:10 – 2:20pm. The specific dates of the videoconferencing are July 2, 9, and 10. All other classes will be videotaped and will be available for you to view at your convenience. You may access the daily class videos via WebCT or you may copy and paste the following web site into your browser for your personal reference:
<http://mediasite.nmu.edu/NMUMediasite/Catalog/?cid=492754d1006e4a1799cd7c26aba237ee>

Prerequisite:

Mathematics education major or minor or elementary education major with mathematics concentration; required course in the Master of Science in Mathematics (MSME) program.

General Introduction and Goals:

Historical and philosophical foundations of mathematics and their relationships to problem solving and applications; proof, logic, and mathematical reasoning; algebraic structures and functions; mathematical representations and coding.

Objectives:

This class will deepen students' understanding of the nature of mathematical reasoning

and proof, and the concomitant need for symbolism. Students will learn how algebraic thinking and structure can lead to applications, and they will become more aware of connections between topics studied in this course and topics taught in the elementary and secondary curriculum.

Content Outline:

This course will examine selected topics from the following areas of mathematics:

- A. Logic and set theory (e.g., syllogisms and the contributions of Aristotle, Euler, Venn, Carroll; Godel's and Cantor's work)
- B. Algebraic structures (e.g., groups, rings, fields)
- C. Code theory (e.g., Fermat's work; Turning machines; enigma machines; public key encryption system; matrices; modular arithmetic)
- D. Problem solving and recreational mathematics (e.g., algebraic methods; systems; classic problems)
- E. History of mathematics (e.g., Greek mathematics; figurate numbers; Fibonacci numbers; cardinality)
- F. Applications (e.g., discovering patterns involving the topics above that have led to applications in biology, weather, photography, computers, etc.)

Assessment Format: Specific information on each assessment measure is provided below.

- **Class Participation (25%):** You will be required to participate in online discussions of problems or other topics that are posted via WebCT. Included in your participation grade is that each of you critiques other students' work that is posted on the discussion board in WebCT.
- **Assignments and Presentations (50%):** A variety of assignments will be given throughout the course that address the topics discussed in class. Some of the assignments will require you to participate in online discussions via WebCT as part of the presentation grade and other assignments will be presented to the class. Two class periods will be devoted to problem presentations via videoconferencing (July 2nd and 9th). It is essential that you are in attendance to present your work to the class. This will also allow you to receive feedback from other students and the instructor.
- **Final Project (25%):** The final project should include material learned from the course. Our last day of class will be a videoconference and will be devoted to the sharing of final class projects. You will need to be present to share your project.

Grading Scale (%): Your course grade will be based on your total number of points as a percentage of the total possible points for the semester. Percents and corresponding grades are listed below.

100 – 93.0: A	86.4 – 82.5: B	76.4 – 72.5: C	66.4 – 62.5: D
92.9 – 89.5: A-	82.4 – 79.5: B-	72.4 – 69.5: C-	62.4 – 59.5: D-
89.4 – 86.5: B+	79.4 – 76.5: C+	69.4 – 66.5: D+	59.4 – 0: F

Appropriate Classroom Laptop Use:

Although having a laptop in class opens up new learning possibilities for students, sometimes students utilize it in ways that are inappropriate. Refrain from instant messaging, e-mailing, surfing the Internet, playing games, writing papers, doing homework, etc. during class time. Acceptable uses include taking notes and working on assigned in-class activities, projects, and discussions that may be enhanced by laptop use. It is easy for your laptop to become a distraction to you and to those around you so please use good judgment in using your laptop during class.

NMU's Non-Discrimination Statement:

Northern Michigan University does not unlawfully discriminate on the basis of race, color, religion, sex, national origin, age, height, weight, marital status, familial status, handicap/disability, sexual orientation, or veteran status in employment or the provision of services, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities.

Anyone having civil rights inquiries may contact the Equal Opportunity Office, 502 Cohodas Hall, telephone number 906-227-2420.

ADA Statement:

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Disability Services Office by: coming into the office at 2001 C. B. Hedgecock; calling 227-1700; or e-mailing disserv@nmu.edu. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.