

### **M103 The Nature of Mathematics**

*MWF 2:30-3:20, Duke Hall 0209 (section 0012)*

**Text:** Mathematical Ideas, 11/e, by Charles D. Miller, Vern E. Heeren, and John Hornsby.

**Prerequisite:** An open mind about mathematics, a willingness to do what it takes to learn, and an interest in expanding your ability to think analytically.

**Instructor:** Dr. Debra Polignone Warne

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**Office Hours:** *Tentatively* MWF 9:00-10:00, Tu 2:00-3:00, *or by appointment.*

**Course Content:** Topics such as set theory, abstract algebra, number theory, history of mathematics, logic, geometry, modeling, and problem solving intended to give students insight into what mathematics is, what it attempts to accomplish, and how mathematicians think. This course is a survey of assorted upper level mathematics topics pitched at an introductory level, and it is not like any mathematics course you've had in high school. If you want more of the same old stuff, take another class. If you want a window into a bigger picture of mathematics, and possibly even some enjoyment or appreciation of mathematics (as well as its role in making your life better), take this course. If you don't want to think, don't take this course. Thinking, however, is an important life skill.

**Goals and Objectives:** Through the study of the topics above, students will develop a basic understanding of both the logical structure and the style of mathematics by

- Developing their logical deduction skills.
- Developing an ability to recognize patterns.
- Developing an ability to extract essential properties from a large class of concrete examples, learning to think abstractly.
- Developing creative problem-solving techniques.
- Writing clear, logical solutions to problems.

**Expectations:** I expect you to be able to think, to read, and to write. I also expect you to work. This course is designed for non-mathematicians, so I do not expect you to already know much mathematics—be sure to ask for clarifications if in working out a problem at the board, there are steps that you don't understand. Mostly this course only requires middle school/junior high mathematics concepts, but it is truly amazing how rich these ideas are. My expectations are very reasonable for this class (come to class, read the book, do the homework, get help with things you don't understand). It will be readily apparent if you do not meet them.

**Attendance:** You are strongly encouraged to attend every class; as is often the case with math courses, failure to do so often correlates strongly with failure. I will take attendance (mostly to help you out—it would be much easier for me not to hold you accountable, but then unfortunately, more of you would fail. Your parents will thank me, and so will you, well, maybe someday). This will figure into about 5% of your grade. You are responsible for the material covered in class regardless of whether or not you were there. I will not use office hours to go over material from classes you missed.

**Notecards:** I will ask you to fill out a notecard with your name, year, major, last math class (what, when), hometown, and some other interesting thing about you. I will use these to help me learn a little more about you, and to randomly call on you to answer questions or present homework solutions in class. This participation aspect of the course will figure into about 5% of your course grade.

**Homework:** Homework will be assigned for each section covered and posted on my M103 link at my website: [www.math.jmu.edu/~warneda/math103.html](http://www.math.jmu.edu/~warneda/math103.html) (note: this is **not on blackboard!**). The purpose of homework is to give you problems on which you can test your understanding of the material. *Without a doubt, doing homework (even more than what is assigned if that's what it takes to understand!) is the most important thing that you can do to maximize your grade.* You are strongly encouraged to work with classmates on homework as a great deal of learning often takes place when working things out with peers. Remember, *understanding* is the goal, not just getting it done. Knowledge must be accumulated slowly and with repetition, not the night before an exam.

**Science/Math Learning Center:** Located in Roop 200, this center provides FREE help with the topics in this course and has widely accessible hours of operation. No appointments are necessary. You should take advantage of this excellent service! See the tutorial center website for details: <http://www.jmu.edu/smrc/>

**Grading Policy:** 90–100: A- to A range; 80–89: B- to B+ range; 70–79: C- to C+ range; 60–69: D to D+ range; 59 and below: F. An exceptional job on the final exam or excellent class attendance and participation could bump borderline cases up to the higher grade. Except in ***extremely rare circumstances***, WF/WP requests will be considered only until one week after the 2<sup>nd</sup> exam. WP grades require a C- average.

Grades will be calculated in the following manner:

1. **Attendance/Participation/In-class work:** 10 %. See the descriptions on the previous page.
2. **Three exams:** 60 % . Each exam will count as 20% of your grade. The exam dates will be announced with reasonable notice throughout the semester. **Do not miss an exam.** *With the exception of an extreme, documented, emergency situation (of which I am judge), a missed exam will result in a score of 0.*
3. **CUMULATIVE final exam:** 30 % . **Do not miss the final exam.** *Same rules as above apply.* Held on Wed. Dec. 12, 1:00–3:00PM, Duke Hall 0209.

**ADVICE:** Do the homework on the day it is assigned. Set aside a specific, regular time each day to do the homework. Watching someone do a problem and thinking you understand it is very different than actually being able to produce the solution yourself, with no help and no prompting. When studying for exams, select and write out some homework problems *randomly* for the material to be covered. Let some time elapse (an hour, a day, etc...) and then try to do them *in a testing situation* (i.e., no book, no notes, no solved problems nearby to lean on). This will give you a much better understanding of how comfortable you are with the material. Obviously, this (generally much more successful) approach to studying for exams requires advance planning. The “night before the test” approach will surely fail you. You need to understand the definitions of concepts as well as how to use them!

**Cheating:** Don't Do It. Your self-respect is worth more than that. So is your opportunity for an education

For your information, a departmental syllabus and mission statement can be found at the following:  
[www.math.jmu.edu/~carother/syllabi/SYL.htm](http://www.math.jmu.edu/~carother/syllabi/SYL.htm)  
[www.math.jmu.edu/~carother/syllabi/missionandgoals.htm](http://www.math.jmu.edu/~carother/syllabi/missionandgoals.htm)