Math 8 — Functions and Models

**Time and place:** 9:15-10:20am, MWF, Adams 219

**Professor:** David J. Hunter, Ph.D.

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- Office Phone: x6075
- Office: Winter Hall 303
- Office Hours: M–F 1–3pm, or by appointment.

**Catalog Description:** “(Four credit hours) Prerequisite: College Algebra or equivalent. A study of topics in precalculus mathematics intended to prepare students for MA 009 or MA 015. Emphasis on using functions to model physical or social systems. (GE Quantitative and Analytical Reasoning.)”

**Core Knowledge:** This course will review and expand on your knowledge of different types of functions and their properties: linear, polynomial, rational, logarithmic, exponential, and trigonometric. You will develop the algebraic knowledge and skills necessary to be successful in calculus: analyzing graphs, manipulating algebraic expressions, transforming functions, and solving equations. Along the way you will see how different types of functions can be used to model real-world situations. You will also be introduced to some of the main ideas of calculus: limits, tangent lines, and areas under curves.

**Communication:** In your future career, your ability to explain technical material will probably be more important than your knowledge of particular mathematical topics. In this course you will present material at the board for your classmates, and you will develop a written portfolio. During your presentations, the rest of the class will question, clarify, and correct.

**Creativity:** The problems that we will be presenting will require you to be creative in how you approach novel quantitative problems. You will seldom be asked to mimic an example given in a textbook or lecture. You will learn more and retain more if you approach problems that you have not seen before and construct the solutions yourself, either by seeking appropriate resources or by reasoning independently.

**Christian Perspective:** The interactive nature of this class will allow us to practice several Christian virtues. Approaching novel problems requires Diligence and Patience. How we respond to the presentations of our classmates should be tempered with Charity and Kindness. And the process of sharing what we know before others will produce Humility. The structure of this class will make it difficult to disguise those moments when we don’t understand, promoting a level of integrity that I believe is lacking in many mathematics classrooms. I encourage you to reflect on how the act of doing mathematics affects your spiritual formation.

**Quantitative and Analytical Reasoning GE:** Functions are an important analytical tool in the sciences. Every branch of science uses functions to understand quantitative relationships. In addition to the natural sciences, functions are used to analyze quantitative models in economics, sociology, and a range of other fields. Functions can also be used to understand numeric data graphically by fitting a line or curve to data.
Inquiry-Based Learning: This course is meant to prepare you for your future studies and work. You will inevitably encounter mathematical concepts in situations where nobody is there to explain things to you. I want you to develop the necessary skills of inquiry to prepare you for these encounters. Therefore, I will often be expecting you to find answers to problems yourself. There will be times when I intentionally leave things unexplained for you to figure out. This is part of an educational strategy designed to make you a better thinker.

Textbook and Portfolio: We will be using the following textbook for reference in this course; it is available online for free.

http://www.opentextbookstore.com/precalc/

You will need a small three-ring binder for your portfolio. You will also need a separate notebook for taking notes in class.

Grading: Your grade will be calculated as follows:

- Presentations: 15%
- Portfolio: 15%
- WeBWorK: 15%
- Tests #1 and #2: 17.5% each
- Final Exam: 20%

The final exam will be on Wednesday, December 11, from 8:00am–10:00am. Finals will not be rescheduled to accommodate travel arrangements.

Presentations and Portfolio: The main focus of this course will be a sequence of portfolio problems. These problems will be assigned during the lectures, and it is your responsibility to accumulate solutions to these problems in a portfolio: a three-ring binder containing the final draft of each solution in your own words. Algebraic calculations and graphs may be hand written, as long as your writing is neat. I will collect your portfolios periodically for grading.

Each portfolio problem will be presented by a randomly chosen student in class, usually on Fridays. It is your responsibility to prepare the problems scheduled for presentation in advance, so you will be ready to present any one of the problems on the day they are due for presentation.

When you are chosen randomly to present a problem, you have the following options:

- Present the problem for a grade. To present a problem, you must write your work on the board, explain it orally to the class, and answer any questions that anyone has.
- Present another assigned problem for a grade, with one point deducted.
- Defer. When you defer, your presentation turn is skipped without penalty. You are allowed two deferrals per semester. After you have used your two deferrals, you will receive a zero if you do not elect one of the first two options. If you are absent or tardy without excuse when you are selected to present, it will cost you a deferral.

Individual presentations are graded according to the following rubric.

- Mostly Wrong: 1 points
- Half Right: 3 points
- Mostly Right: 5 points
This scoring system is generous because I expect you to make mistakes and learn from them. There is an inherent subjectivity to your presentation grade, but I will try to be as fair as possible. Please feel free to come to office hours if you would like to discuss how your presentation grade is progressing.

**WeBWorK:** In addition to the portfolio problems, you will be assigned practice problems on WeBWorK, an online homework system for mathematics. You may work together on these problems, but most problems contain randomized elements so that each of you will have a slightly different version. You may attempt each problem multiple times, so if you persist, your WeBWorK grade should be high. Late WeBWorK assignments will not be accepted. Your lowest WeBWorK grade will be dropped. After you finish your WeBWorK assignment, print out a hard copy and include it in your portfolio.

**Exams:** We will have two written exams in class during the semester, and a cumulative written final exam. I will announce the dates and scope of these exams on Eureka well in advance.

**No Laptops:** Please do not use any electronic devices during class (laptops, tablets, phones, etc.). Take notes with a pen or pencil in your notebook.

**Attendance:** Please show up to class on time; it is rude and distracting to your classmates if you come to class late. Significant tardies count as absences. If you miss an excessive number of classes, you will almost definitely do poorly in this class. I consider it excessive to miss more than three classes during the course of the semester. If you miss more than six classes without a valid excuse, I reserve the right to terminate you from the course with a grade of F. Work missed (including tests) without a valid excuse will receive a zero.

**Other Policies:** I will post the assignments and other course materials on the eureka page for this course. Go to https://eureka.westmont.edu and make sure you are subscribed to this course; a link should appear after you have logged in. I expect you to check this page, along with your email, on a regular basis. If you use a non-Westmont email account, please forward your Westmont email to your preferred account.

Learning communities function best when students have academic integrity. Cheating is primarily an offense against your classmates because it undermines our learning community. Therefore, dishonesty or plagiarism will result in a zero for the work in question, and repeated or major infractions will result in expulsion from the course with a grade of F.

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Students who have been diagnosed with a disability (learning, physical or psychological) are strongly encouraged to contact the Disability Services office as early as possible to discuss appropriate accommodations for this course. Formal accommodations will only be granted for students whose disabilities have been verified by the Disability Services office. These accommodations may be necessary to ensure your full participation and the successful completion of this course. Please contact Sheri Noble, Interim Coordinator of Disability Services (x6186, snoble@westmont.edu) as soon as possible.
Tentative Schedule: We will try to conform to the following schedule, although it is subject to revision at the instructor's discretion. The Eureka page will tell you more detailed information about when work is due.

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