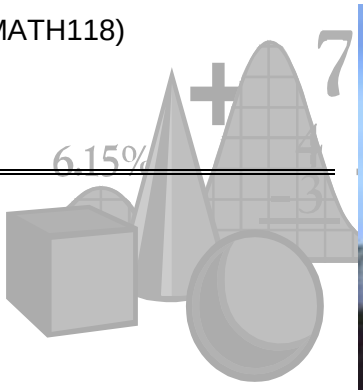
# *Math for the Natural Sciences* (MATH118)

*Fall Term 2017*
M W F 1:00-1:50, Hirt 207
Th 1:00-1:50, Hirt 209




**Professor:** Patrick M. Kelly

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**Office Hours:**

| | |
|---|---|
| Mondays: | 9:00-10:15 |
| Tuesdays: | 12:00-1:00 |
| Wednesdays: | 9:00-10:15 |
| Thursdays: | 11:00-12:00 |
| Fridays: | 9:00-10:30 |

*Meeting times by appointment may be arranged as well.*

## Other Information:

This course is registered on *Blackboard*, an academic software package set up on Mercyhurst's internet server. You may access information about the course via *Blackboard* at any time from any computer. Please check that the e-mail address listed for you on *Blackboard* (most likely your Mercyhurst account) is the account that you use regularly. Please change it on *Blackboard* if this is not the case.

## Prerequisite:

A minimum score of 54 on the ALEKS placement exam is required for this course.

## Text:

Precalculus Essentials (4th Edition) by Robert Blitzer
ISBN-13: 9780321729569 Publisher: Pearson

## Calculator:

Take it under advisement that you will not be permitted to use a calculator (or other electronic device) on any quizzes or exams. You are strongly encouraged to avoid using a calculator while working on homework so that it doesn't become a crutch for you.

## Course Description:

This course has been designed for students who plan to take Calculus but may be deficient in some aspects of their mathematical preparation. While many of the topics covered are similar to those covered in a typical college precalculus course, there is more emphasis on the application, a faster pace is maintained, and a greater depth of understanding is required. It is expected that students have taken Intermediate Algebra and Precalculus prior to this class; as stated, this course is intended to fix deficiencies.

The course will cover the fundamental concepts of college algebra, precalculus, and a preparation for calculus. More specifically, the topics will include factoring, integer and rational exponents, simplifying algebraic expressions, solving equations and

inequalities, basic trigonometry, function notation, polynomial and rational functions, exponential and logarithmic functions, trigonometric and inverse trigonometric functions, graphs of functions and applications.

## Student Learning Outcomes:

Upon successful completion of this course a student will be mathematically prepared to succeed in a college calculus course, and subsequent science courses. In particular, the student will:

- demonstrate a working knowledge of the basics of the language of mathematics;
- have acquired study habits necessary for continued success in subsequent science and mathematics courses;
- apply an understanding of algebra as required in both calculus and applications in sciences;
- organize mathematical tools, techniques, procedures, and problem solving skills further developed in this course, enabling the student to utilize the appropriate tools to restate, setup, and then solve problems in calculus and beyond; and
- continue to develop mathematical skills and thought processes subsequent to this course, given the solid foundation built in this course.

## Grading:

Your final course grade will be compiled from several factors. Homework assignments, quizzes, four in-class exams, and the cumulative final exam will be considered for the course grade calculation. The breakdown for each component is as follows:

five hand-in homework assignments, 10 points each = 50 points
eight quizzes, 20 points each = 140 points (lowest score dropped)
four exams, 100 points each = 400 points
final exam, 160 points
total: 750 points

Course grades will be determined using the following scale:

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|---|---|---|---|
| A | 672-750 points (90-100%) | B+ | 649-671 points (87-89%) |
| B | 597-648 points (80-86%) | C+ | 574-596 points (77-79%) |
| C | 522-573 points (70-76%) | D | 447-521 points (60-69%) |
| F | 0-446 points (below 60%) | | |

## Homework:

Homework in a mathematics class is a must! Selected problems from each section lectured on in class will be assigned as suggested exercises. I will not be checking these problems, they are your responsibility to do and understand (I *am* available for even the most trivial of questions. . . .). Note: Anytime a particular section is covered in class—and exercises are assigned from that section—an implied homework assignment is to read that section. You will gain insight on the topic covered in class by reading the author's explanation and looking through his examples.

Five Hand-in Homework assignments will be given throughout the term as well, each worth 10 points toward your final course score.

## Quizzes:

Quizzes will be used as an assessment of your understanding of the material and your progress in the course. Quizzes will be held eight times during the term, as (mostly) slated on the course schedule on the last pages of this syllabus.

Six quizzes are included in the schedule on this syllabus; the other two will be unannounced. If you are absent (excused or unexcused) on the day of an unannounced quiz, you will receive a zero for that quiz—there are no make-up opportunities for these quizzes.

At the end of the semester, your lowest quiz score will be dropped.

## Exams:

There are four in-class exams scheduled for the course. Be sure to note the scheduled dates as detailed on the last couple of pages of this syllabus.

All exams are cumulative; each exam will include some material from the previous exams. Mathematics is a cumulative effort, and mastering each topic is only possible if you have mastered earlier concepts.

## A Few Policies:

- You are responsible for all that is covered (including announcements) in class even if you are absent.
- If you miss a quiz or an exam, a make-up is only considered when (a) notice is given (when possible) prior to the missed assessment, (b) there is a valid reason for missing, and (c) **the make-up assessment is completed prior to the next class session**.
- Office hours are not for reteaching lessons or catching you up on something you missed.
- You are responsible for all the material in a given section unless told otherwise. Use the course schedule and suggested homework as a guide.
- A prerequisite for additional help outside the classroom is regular class attendance.

## Cell Phones:

Before each class session begins, please try to remember to turn your phones off so as not to cause a disruption during class (and do realize that even the sound of a vibrating phone can be disruptive). Furthermore, cell phones are not permitted at all during exam situations (quizzes and tests).

Services:

Tutoring

Free tutoring sessions for several different mathematics courses—**Math for the Natural Sciences in particular**—are available to you. These sessions adhere to the following schedule:

| Day | Time | Room |
|---|---|---|
| Monday | 6:00-8:00 | Zurn 213 |
| Tuesday | 6:00-8:00 | Zurn 213 |
| Thursday | 6:00-8:00 | Zurn 213 |

No appointment is necessary; just walk on in! Below is a link to their website:
http://math.mercyhurst.edu/~griff/courses/Tutoring/
You are strongly encouraged to utilize this tutoring service if you find yourself in need of some extra assistance.

Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences at 824-3017 or stop by Old Main room 314, to arrange a confidential appointment with the Disability Services Director during the first week of classes.

(Tentative) Course Schedule:

| Day | Section | Material |
|---|---|---|
| Wednesday, 8/23 | | Intro to the course; assessment |
| Thursday, 8/24 | §P.1 | Algebraic Expressions, Mathematical Models, and Real Numbers |
| Friday, 8/25 | §P.2 | Exponents and Scientific Notation |
| Monday, 8/28 | §P.3 | Radicals and Rational Exponents |
| Wednesday, 8/30 | §P.3 | Radicals and Rational Exponents |
| Thursday, 8/31 ***Quiz*** | §P.4 | Polynomials |
| Friday, 9/1 | §P.5 | Factoring Polynomials |
| Monday, 9/4 | *Labor Day—no classes!* | |
| Wednesday, 9/6 | §P.6 | Rational Expressions |
| Thursday, 9/7 | §P.6 | Rational Expressions |
| Friday, 9/8 ***Quiz*** | §P.7 | Equations |
| Monday, 9/11 | §P.7 | Equations |
| Wednesday, 9/13 | | Review/Catch-Up |
| Thursday, 9/14 | ***Exam #1*** | |
| Friday, 9/15 | §P.9 | Linear Inequalities and Absolute Value Inequalities |
| Monday, 9/18 | §1.1 | Graphs and Graphing Utilities |
| Wednesday, 9/20 | §1.2 | Basics of Functions and Their Graphs |
| Thursday, 9/21 | *Mass of the Holy Spirit—no class at our time* | |
| Friday, 9/22 ***Quiz*** | §1.3 | More on Functions and Their Graphs |
| Monday, 9/25 | §1.4 | Linear Functions and Slope |
| Wednesday, 9/27 | §1.5 | More on Slope |
| Thursday, 9/28 | §1.6 | Transformations of Functions |
| Friday, 9/29 | §1.6 | Transformations of Functions |
| Monday, 10/2 ***Quiz*** | §1.7 | Combinations of Functions; Composite Functions |
| Wednesday, 10/4 | §1.8 | Inverse Functions |
| Thursday, 10/5 | §1.9 | Distance and Midpoint Formulas; Circles |
| Friday, 10/6 | | Review/Catch-Up |
| Monday, 10/9 | ***Exam #2*** | |
| Wednesday, 10/11 | §1.10 | Modeling with Functions |
| Thursday, 10/12 | *Mid-Semester Break—no classes!* | |
| Friday, 10/13 | | |
| Monday, 10/16 | §1.10 | Modeling with Functions |
| Wednesday, 10/18 | §2.1 | Complex Numbers |
| Thursday, 10/19 | §2.2 | Quadratic Functions |
| Friday, 10/20 | §2.3 | Polynomial Functions and Their Graphs |
| Mon., 10/23 ***Quiz*** | §2.4 | Dividing Polynomials; Remainder and Factor Theorems |
| Wednesday, 10/25 | §2.4 | Dividing Polynomials; Remainder and Factor Theorems |
| Thursday, 10/26 | §2.6 | Rational Functions and Their Graphs |

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|---|---|---|
| Friday, 10/27 | §2.6 | Rational Functions and Their Graphs |
| Monday, 10/30 | §2.7 | Polynomial and Rational Inequalities |
| Wednesday, 11/1 | §3.1 | Exponential Functions |
| Thursday, 11/2 | | Review/Catch-Up |
| Friday, 11/3 | ***Exam #3*** | |
| Monday, 11/6 | §3.2 | Logarithmic Functions |
| Wednesday, 11/8 | §3.3 | Properties of Logarithms |
| Thursday, 11/9 | §3.3 | Properties of Logarithms |
| Friday, 11/10 | §4.1 | Angles and Radian Measure |
| Monday, 11/13 | §4.2 | Trigonometric Functions: The Unit Circle |
| Wednesday, 11/15 | §4.3 | Right Triangle Trigonometry |
| Thursday, 11/16 | §4.4 | Trigonometric Functions of Any Angle |
| Friday, 11/17 ***Quiz*** | §4.5 | Graphs of Sine and Cosine Functions |
| Monday, 11/20 | §4.6 | Graphs of Other Trigonometric Functions |
| Wednesday, 11/22 | *Thanksgiving Break—no classes!* | |
| Thursday, 11/23 | | |
| Friday, 11/24 | | |
| Monday, 11/27 | §4.7 | Inverse Trigonometric Functions |
| Wednesday, 11/29 | §4.7 | Inverse Trigonometric Functions |
| Thursday, 11/30 | | Review/Catch-Up |
| Friday, 12/1 | ***Exam #4*** | |
| Monday, 12/4 | §5.1 | Verifying Trigonometric Identities |
| Wednesday, 12/6 | §5.1 | Verifying Trigonometric Identities |
| Thursday, 12/7 | §5.5 | Trigonometric Equations |
| Friday, 12/8 | §5.5 | Trigonometric Equations |
| Wed., 12/13 at 1:00 | ***Final Exam*** | |