
MATH 118-01 Mathematics for the Natural Sciences

Spring 2015 · Syllabus

Class Information

Instructor: Dr. Lauren Williams

Class Meeting: MWF 2:15 - 3:45 in Zurn 213

Office: Old Main 401 (Tower)

Office Phone: (814) 824-2226

Office Hours: Mon 9:15-10:15 and 1-2, Tues 9:15-11:30, Wed 9:15-10:15 and 12:30-2, Fri 9:15-10:15

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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.

Course Objectives

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:

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

Textbook

Precalculus Essentials, Fourth Edition, by Robert Blitzer. There is a newer edition of the text, but the fourth edition is available in the bookstore and can be found online.

No other supplies are required for the course. Calculators (or computers and software) are neither required nor suggested. You will not be permitted to use calculators on quizzes or exams, and it is highly recommended that you avoid using them when doing the homework.

Homework

When we finish a section in the book, you should immediately begin working on the homework problems from the list attached.

Your work will not be collected. However, actually working through these problems is the key to your success in this class. Attending every class is not enough; mathematics can only be learned through practice. You should plan to spend a significant amount of time on the homework. It is expected that you spend approximately 8-12 hours per week studying the material outside our class meetings, according to the typical 2-3 hour per credit rule of thumb.

Stay up to date with homework, and get help if you cannot understand a problem after trying it on your own. Do not ignore a problem that you are struggling with. Our class is focused on the foundations of mathematics that you will need in this course and in Calculus. A weak spot in this foundation will lead to a bigger problem in the future.

If you are having trouble with a topic, please come talk to me during office hours, ask questions in class, seek help from a classmate, or go to the department tutors for assistance. You are expected to try to work on all problems on your own first; when coming to my office, be prepared to show me what you've already tried.

Quizzes

You will be given quizzes on the material regularly. Keeping up with the homework will ensure that you are prepared for the quizzes, which will feature problems very similar to those in the homework. Some of these quizzes will be given in class, others will be take home quizzes. The dates will be announced before it is given. You should always be prepared for an in-class quiz.

Quiz grades will not be based strictly on whether or not you found the correct answer. Your work must also be written clearly, and with proper notation, to receive full credit.

There are no make-ups for missed quizzes, including take home quizzes (if you are absent the day a take home quiz is given out, you will not receive a grade). Your two lowest quiz grades will be dropped from your average, including any missed quizzes.

Midterm Exams

We will have four unit exams. Use of notes, textbooks, calculators, electronic devices, or other materials will not be permitted during an exam.

Wednesday, February 8

Wednesday, March 18

Friday, April 10

Wednesday, April 29

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.

Your lowest exam grade will be replaced by your final exam grade, if your final exam grade is better. There are no make up exams; a missed exam grade will be replaced by your final exam grade. A second missed exam will receive a grade of 0, so please check your schedules carefully and ensure that you can attend all exams. If you are an athlete, or will be missing an exam for another school function, please let me know well in advance.

Final Exam

The final exam will be cumulative, and is scheduled for **Wednesday, May 13, 1:00-3:00 pm**.

Final Grades

Grades will be calculated as follows:

60% - Average of 4 midterm exams (lowest replaced by final exam, if better)

15% - Average of homework quizzes (lowest two grades dropped)

25% - Final Exam

Grading scale:

F	D	D+	C	C+	B	B+	A
0-59	60-64	65-69	70-77	78-83	84-89	90-93	94-100

Quiz and exam grades will be posted on Blackboard, so you can keep track of your progress at any time.

Tutoring

The Department of Mathematics offers free tutoring for Calculus I students in Zurn 213. No appointments are needed, just drop by according to the schedule below. You are free to ask tutors questions on any assigned homework and exam review sheets.

Sunday 7 - 9 pm	Monday 7 - 9 pm	Tuesday 7 - 9 pm	Thursday 7 - 9 pm
Rachel Lexi	Michael Lexi	Rachel Danielle Mary	Danielle Michael Jenna

Other Information

1. You are neither expected nor required to purchase any materials for the course aside from the required textbook. Graphing calculators and mathematical software could be used to check your work, but should not be relied on to do the work for you.
2. I will attempt to return emails as thoroughly and promptly as possible. However, it is generally better to ask complicated questions during class or in office hours. If you have a question about the homework, it is quite likely someone else has the same question, so you're doing the class a favor by asking!
3. There are other textbooks available in the library and in my office. Due to book prices, you may not want to invest in a second book, but it can be helpful to have alternate sources or see topics explained in other ways.
4. I do not keep detailed lecture notes. It is highly recommended that you establish contacts among your classmates to get notes in case you miss class.
5. Attendance is not required, but coming to class regularly will generally improve your grade. You are responsible for any work material covered in your absence. Please contact me if you are absent for an extended period.
6. Calling my office phone is rarely the best way to get in touch with me, unless I am in my office. Email is the fastest way to get in touch with me outside of office hours.

Support of the Mercy Mission

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying critical thinking and qualitative reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies.

Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences Program secretary at 824-3017, to arrange a confidential appointment with the director of the Learning Differences Program during the first week of classes.

Useful Resources

The course website has a more extensive list (and constantly growing) list of resources that may help you succeed in the class. In particular, you may be interested in:

1. **Kahn Academy, www.kahnacademy.org** Features video tutorials for a range of topics we'll be covering. In addition to mathematics, Kahn Academy has videos for just about any class you might be taking, from art history and music to chemistry and computer science.
2. **Wolfram Alpha, www.wolframalpha.com** Incredibly powerful and easy to use, Wolfram Alpha is a web based mathematics program that can help you check your work, visualize functions, and view detailed examples.

Math 118-01 Spring 2015 Course Schedule

Date	Topic
Jan 28	Class Introduction P.1 Algebraic Expressions, Mathematical Models, and Real Numbers
Jan 30	P.2 Exponents and Scientific Notation P.3 Radicals and Rational Exponents
Feb 2	P.3 Radicals and Rational Exponents P.4 Polynomials
Feb 4	P.4 Polynomials P.5 Factoring Polynomials
Feb 6	P.5 Factoring Polynomials P.6 Rational Expressions
Feb 9	P.7 Equations
Feb 11	P.9 Linear Inequalities and Absolute Value Inequalities
Feb 13	1.1 Graphs and Graphing Utilities 1.2 Basics of Functions and Their Graphs
Feb 16	Review
Feb 18	EXAM I
Feb 20	1.3 More on Functions and Their Graphs 1.4 Linear Functions and Slope
Feb 23	1.4 Linear Functions and Slope 1.5 More on Slope
Feb 25	1.6 Transformations of Functions
Feb 27	1.7 Combinations of Functions; Composite Functions 1.8 Inverse Functions
Mar 2	1.9 Distance and Midpoint Formulas, Circles 1.10 Modeling with Functions
Mar 4	2.1 Complex Numbers 2.2 Quadratic Functions
Mar 6	2.2 Quadratic Functions 2.3 Polynomial Functions and Their Graphs
Mar 9 - 13	<i>Mid Semester Break - NO CLASS</i>
Mar 16	Review
Mar 18	EXAM II
Mar 20	2.4 Dividing Polynomials; Remainder and Factor Theorems
Mar 23	2.5 Zeros of Polynomial Functions
Mar 25	2.6 Rational Functions and Their Graphs
Mar 27	2.7 Polynomial and Rational Inequalities
Mar 30	3.1 Exponential Functions
Apr 1	3.2 Logarithmic Functions
Apr 2	3.3 Properties of Logarithms
Apr 3	<i>Easter Break - NO CLASS</i>

Math 118-01 Spring 2015 Course Schedule (Continued)

Apr 6	<i>Easter Break - NO CLASS</i>
Apr 8	Review
Apr 10	EXAM III
Apr 13	4.1 Angles and Radian Measure 4.2 Trigonometric Functions: The Unit Circle
Apr 15	4.3 Right Triangle Trigonometry
Apr 17	4.4 Trigonometric Functions of Any Angle
Apr 20	4.5 Graphs of Sine and Cosine Functions
Apr 22	4.6 Graphs of Other Trigonometric Functions
Apr 24	4.7 Inverse Trigonometric Functions
Apr 27	Review
Apr 29	EXAM IV
May 1	5.1 Verifying Trigonometric Identities
May 4	5.5 Trigonometric Equations
May 6	Review for Final Exam
May 8	<i>Reading Day - NO CLASS</i>
May 13	FINAL EXAM, 1 - 3 pm

Math 118-01 Spring 2015 Homework Assignments

Note: Numbers always refer to problems in the "Exercise Set" portion, not "Concept and Vocabulary Check".

Section	Page	Problems
P.1	17	3, 9, 11, 15, 19, 21, 27, 29, 35, 53, 55, 59, 63, 69, 87, 91, 93, 99, 103, 107, 115, 117, 119, 121, 125
P.2	30	1, 3, 5, 9, 17, 21, 27, 31, 37, 41, 47, 51, 61, 65, 67, 77, 83, 107, 109, 111, 113
P.3	45	1, 3, 5, 7, 11, 15, 17, 25, 29, 35, 37, 41, 45, 51, 57, 61, 66, 71, 73, 77, 81, 87, 89, 91, 97, 109, 111, 137, 139, 143
P.4	56	1, 3, 5, 7, 9, 11, 13, 15, 21, 33, 37, 47, 55, 67, 71, 79, 83, 87, 93, 95, 107, 111, 113
P.5	68	5, 9, 11, 15, 17, 21, 25, 31, 37, 41, 45, 49, 53, 57, 61, 65, 71, 77, 79, 83, 87, 93, 99, 103, 109, 117, 121
P.6	83	1, 5, 9, 13, 15, 19, 25, 28, 31, 33, 35, 41, 47, 55, 59, 63, 67, 71, 73, 77, 85, 87, 106, 107, 108, 121
P.7	103	3, 9, 13, 17, 21, 25, 29, 41, 43, 47, 51, 55, 61, 75, 79, 85, 87, 91, 95, 101, 107, 117, 123, 125, 129, 133, 172
P.9	131	3, 5, 13, 15, 17, 27, 35, 41, 53, 59, 65, 73, 77, 85, 93, 95, 97, 113, 119, 123
1.1	150	13, 23, 25, 27, 41, 43, 47, 49, 71, 73, 79-82
1.2	168	1, 3, 9, 11, 15, 25, 27, 29, 31, 35, 37, 39, 43, 49, 65, 67, 69, 71, 73, 75, 77, 81, 83, 85, 89, 95, 131
1.3	182	1, 5, 9, 13, 17, 19, 23, 29, 33, 35, 37, 41, 43, 47, 55, 59, 61, 71
1.4	199	1, 5, 9, 11, 15, 23, 25, 31, 35, 37, 39, 43, 47, 59, 63, 67, 85, 118, 120
1.5	211	1, 3, 9, 13, 15, 21, 25, 27
1.6	227	1, 7, 9, 11, 13, 15, 17, 19, 21, 33, 43, 145, 153, 155
1.7	242	1, 5, 11, 15, 19, 21, 31, 35, 47, 51, 53, 57, 61, 65, 73, 83, 91, 93, 95
1.8	254	1, 3, 5, 9, 11, 15, 17, 25, 29-34, 37, 39, 59, 63, 69, 93, 98
1.9	264	1, 9, 15, 19, 31, 35, 41, 45, 51, 53, 59, 100
1.10	276	5, 15, 19, 21, 27, 31, 47, 68
2.1	298	3, 5, 11, 13, 17, 21, 27, 29, 33, 37, 47, 51, 55
2.2	313	1-4, 9, 13, 21, 33, 41, 45, 63, 67
2.3	330	1, 5, 7, 15-18, 19, 23, 25, 27, 31, 33, 35, 41, 47, 109
2.4	343	1, 3, 5, 7, 9, 17, 19, 27, 33, 37
2.5	356	1, 3, 5, 7, 9, 11, 13, 17, 25, 31, 33, 37
2.6	377	1, 3, 21, 25, 33, 37, 43, 57, 71, 73, 91, 93, 95
2.7	391	1, 5, 11, 15, 25, 31, 39, 41, 43, 51, 55, 59, 69, 111
3.1	423	19-24, 25, 29, 33, 35, 43, 45, 47, 49, 57, 59, 93
3.2	437	1, 3, 5, 7, 9, 11, 17, 19, 21, 25, 29, 35, 39, 41, 47-52, 53, 57, 81, 83, 89, 95, 129, 131
3.3	461	1, 5, 9, 13, 19, 23, 27, 31, 41, 43, 47, 53, 55, 71, 87, 89, 95, 101, 117
4.1	505	1, 3, 5, 13, 17, 19, 21, 25, 41, 43, 47, 51, 55, 57, 59, 63, 69, 77-82
4.2	520	1, 3, 5-18, 25, 29, 33, 37, 39, 45, 47, 71, 77, 103
4.3	533	1, 3, 7, 9, 13, 17, 19, 21, 25, 43, 45, 47, 81
4.4	548	1, 5, 9, 13, 15, 35, 47, 51, 57, 61, 65, 71, 79, 81, 87, 89, 91, 95, 99
4.5	568	1, 5, 7, 9, 13, 17, 21, 23, 29, 31, 37, 43, 47, 61, 63, 65, 67, 71
4.6	581	1-4, 5, 7, 11, 25, 27, 29, 31, 35, 43, 53, 55, 93, 95, 99
4.7	598	1, 5, 7, 9, 13, 17, 47, 51, 57, 61, 63, 67, 75, 81, 85, 89, 91
5.1	630	1, 5, 7, 9, 11, 13, 17, 21, 29, 37, 41, 43, 45, 51, 55, 59, 67, 71, 73, 78, 93, 95
5.5	674	1, 7, 9, 13, 15, 21, 25, 31, 37, 39, 41, 47, 55, 59, 63, 69, 77, 83, 117

Mercyhurst University – CORE Curriculum
Category V - Scientific, Quantitative, and Critical Reasoning

MATH 118 – Spring 2015

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This course has been approved for the Mercyhurst University Core and fulfills a requirement in Core Area V. The following explicates the Core Learning Outcomes that are associated with this course and how they will be assessed as part of the Core requirements.

Core Learning Outcomes and Assessment Strategies

The table below highlights the Student Learning Outcomes associated with every course in *Core Area V - Scientific, Quantitative, and Critical Reasoning*.

Primary Learning Outcome	Learning Objective	Associated Assessment
Quantitative and Scientific Reasoning	Use mathematical concepts to make logically sound decisions, judgments, and/or predictions; effectively use scientific inquiry and reasoning to solve problems and analyze and interpret data.	Quantitative conceptual evaluation, issued online to all student enrolled in an relevant course

All Core Student Learning Outcomes are assessed on a rotating basis of at least once every three years. All assessment documents and information including the scoring rubrics can be found on the Mercyhurst portal and website. Please direct questions to the course professor or to the Core Assessment Coordinator – coreassessment@mercyhurst.edu.

Course Learning Goals and Objectives

Supporting Learning Outcome

Critical Thinking

Supporting Learning Outcome

Creative Thinking

The following course objectives detail how the specific content of this course will support the above Core Outcomes.

- use their algebraic skills including: factoring, integer and rational exponents, simplifying algebraic expressions
- display a working understanding of
 - basic trigonometry
 - function notation
 - polynomial and rational functions
 - exponential and logarithmic functions
 - trigonometric and inverse trigonometric functions
 - graphs of functions