Math 1014 Intensive Precalculus (4 cr)

Session: Summer 2012
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Communication with me should be through our course moodle site. Email and phone are for emergencies only.
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Course moodle site: https://moodle2.umn.edu/course/view.php?id=4596
Instructor's Website: http://facultypages.morris.umn.edu/~mcquarrb/

Course Prerequisites

Mathematics

To succeed in this course you will need to have mastered basic algebraic manipulations (finding common denominator, solving simple linear and quadratic equations, factoring, sketching straight lines and quadratics, etc.) and be very comfortable and confident working with fractions. Historically, students who do not have these skills have not succeeded in this course.

Motivation

Since this is an online course, you will also need to be motivated and able to work on the course every day. Although the course is online, it is <u>not</u> self-paced and you need to be able to keep up with the material.

Technologies

Since this course is entirely online (except for proctored exams), you will need the following free technologies to use the course materials I have created:

- Firefox web browser (some components work best with firefox)
- QuickTime video player
- a PDF reader, typically Adobe Reader X

You will need to be able to work with multiple open browser windows at once, and it would be helpful to have access to a printer to print some of the materials for easy reference.

Using Firefox 4, QuickTime 7, and Abobe Reader X 10, I have tested the course on a PC, on a Macbook Pro, an iMac, and an iPad, and everything works well. If you have any difficulty using the resources in the course please get in touch with me right away by posting to the Course Feedback forum, or sending me an email if you cannot access the course moodle site.

You will also need a pen and paper since you should be making your own notes on the topics!

Learning Objectives

This is an intensive preparatory course for students who intend to take calculus. You should take calculus as soon as possible after completing this course, preferably the following semester.

A detailed list of topics covered are at the end of the syllabus. A student who successfully completes this course should be able to

- manipulate functions algebraically and graphically,
- work with polynomial, power, rational, exponential, logistic, and logarithmic functions,
- work with trigonometric function, and understand trigonometric identities.

Beyond the curriculum, you should also expect to

- develop skill and confidence in problem solving,
- develop good study habits,
- develop an understanding of why the math works as it does, not just focus on memorizing techniques.

Time Commitment

University policy says "one credit is defined as equivalent to an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course". Our course is a ten week online four-credit course, so you should spend about $12 \times 15 \div 10 = 18$ hours per week on the class.

You should set your sights higher than "average student, average grade", so expect to spend more than eighteen hours a week. It will take a large amount of your time and focus to do well in this class, as you will need to memorize techniques ("how") and well as understand concepts in depth ("why"), and the course moves at a rapid pace.

Textbook

The textbook is Demana, Waits, Foley & Kennedy *Precalculus: Graphical, Numerical, Algebraic* 7th Ed or 8th Ed.

The course calendar is based on the 8th Edition. The differences between the editions is minimal, but if you use an earlier edition be aware that some of the sections may be numbered differently, content may be slightly different, and problems may not line up with your older edition.

Graphing Calculators

A graphing calculator will be useful, but not required. Calculus at UMM is taught with the use of the computer algebra system *Mathematica*, therefore I will use *Mathematica* for any plots we do not create by hand. However, the focus will be on doing things by hand, without the use of a calculator whenever possible. You will be allowed to use a calculator on tests, but it will be of only minimal help.

If you do not have a calculator, there is no need to go buy one! You can use the webpage WolframAlpha as your calculator. There are apps for the iPad, but they simply offer a better interface than the standard website. I have a video of how to use WolframAlpha available you can check out.

Course Components

The course is hosted on a moodle site, organized by topic, and follows the UMM academic calendar. Each topic has the following components.

Lecture Notes. I have provided my lecture notes, which is what I would use in a face-to-face course.

Practice Problems. I have provided some practice problems that show complete solutions to typical problems from the topic. You should try to answer the questions yourself first before you read my solutions.

Guided Examples. There are videos of me solving problems for each topic, so you can see the thought process that goes into the solution.

Textbook. Usually, the topic is also discussed in the textbook, and I direct you to the appropriate section.

Discussion Forums. This is an important part of the course, a place for you to post questions you have with the topic, to answer other students questions, and receive answers from me. I will be a frequent contributor in the forums. Please use correct spelling, grammar, and punctuation in your forum posts.

WeBWorK. This is a graded component of the course, and for each topic there will typically be 4 or 5 problems for you to do.

There are also:

Glossary Wiki. You will help create a glossary of the terms we use in the course.

Techniques Wiki. You will help create a list of techniques we use in the course.

Tests

The tests (four unit tests and a cumulative final exam) will be scheduled with your proctor, and taken on the days listed on the moodle site. You will not be allowed any outside material on your desks during tests. I will allow you to use a calculator on tests, but you shouldn't need one to solve the problems (and you should prepare for tests as if you won't be able to use your calculator).

It will be important to show your work, since the method of solution is just as important as the final answer. I will be looking for solutions as complete as what you have seen in the practice problems, the guided examples, and on the practice tests I will provide.

More Information

On the course moodle site you will find the following:

- Video Tour of our Course Moodle Site
- Video Tour of WeBWorK
- How to Get the Most out of This Course
- Instructions for WeBWorK
- Video on How to Use WolframAlpha

Please take the time to view or read these resources, and refer back to them if necessary.

Grading Policy

Here is the University-wide uniform grading policy.

- A: Represents achievement that is outstanding relative to the level necessary to meet course requirements.
- B: Represents achievement that is significantly above the level necessary to meet course requirements.
- C: Represents achievement that meets the course requirements in every respect.
- D: Represents achievement that is worthy of credit even though it fails to fully meet the course requirements.
- F: Represents failure and indicates that the coursework was completed but at a level unworthy of credit, or was not completed and there was no agreement between the instructor and student that the student would be temporarily given an incomplete.
- I: See the catalog. Awarded only under exceptional circumstances.

A few of you may be taking the course S-N. In this case, you need to earn a C− to receive an S.

There will be five tests in the course, WeBWorK, and a comprehensive final exam. The grade for the course will be calculated by the following formula (there is no extra credit):

Unit Tests are 13% each	52%
WeBWorK	20%
Participation	5%
Final Exam	23%

Your numerical grades will be converted to letter grades and finally Grade Points via the following cutoffs (grades are not rounded up):

Numerical	95.0%	90.0%	87.0%	83.0%	80.0%	77.0%	73.0%	70.0%	65.0%	60.0%	Below 60.0%
Letter	A	A−	B+	B	B−	C+	C	C−	D+	D	F
Grade Point	4.00	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.00

Grading Criteria

Participation

Participation will be graded based on the number of contributions you make to the discussion forums and the two wikis over the entire semester. A contribution includes:

- asking a question on a forum
- answering another student's question on a forum
- adding an entry to either of the wikis (glossary or techniques)

Total Contributions for semester	0,1,2,3	4,5,6,7	8,9,10,11	12,13,14,15	16,17,18,19	20	over 20
Participation Percentage	0%	1%	2%	3%	4%	5%	5%

There is no extra credit for contributing more than 20 times, but of course you should feel free to do so.

Once a week I will update your participation grade in moodle, so it will always be a bit behind your actual participation grade.

WeBWorK

There are approximately 230 WeBWorK problems for the entire course.

Each problem set will consist of a few problems (except the algebra review which has more than usual). You can complete some of the problems in a set and return later to complete the rest, and the computer will remember the ones you have already completed. You can submit answers to a problem again and again, until you get it correct–but guessing is not a good strategy! There is no penalty for trying a problem multiple times before you get it correct.

Some problems allow you to earn partial credit. You will always retain the highest partial credit you have earned from all attempts, so if you try again and do worse you aren't penalized.

Once a week I will update your WeBWorK grade in moodle, so it will always be a bit behind your actual participation grade. You can always see exactly how you are doing in WeBWorK by checking your grade in WeBWorK.

Tests

Some of you may be used to seeing math graded based on the final answer, and either correct or incorrect with little attention paid to the steps that led you to the answer. I am grading you based on the process you describe to obtain your solution, as well as your final answer.

I read each solution as a self contained document, and look for internal consistency in the solution you provide. Questions I have in my head are:

- Are the steps clearly explained?
- Is the mathematics you used correct?
- Is the mathematical notation used correctly?
- Is the mathematics you used the correct mathematics needed to solve the problem?

I do not compare your solution to my solution. Solutions which are different from mine can be 100% correct, as long as they are explained well and use correct mathematics.

All errors are not equal, some are more serious than others. For example, forgetting to distribute a minus sign in a well presented solution is not as serious as a solution that is hard to follow and which contains errors in mathematical notation. The grade for the second will be lower, even if the final answer is correct.

I will comment on things you have done well, and also on things you could do differently to improve your solution. If you do not understand a comment, ask me to explain it in more detail.

Grading Notations

- $\checkmark$: A check mark means "this is correct", usually in terms of the step you used in the process of solution.
- X or $\bigotimes$ (X in a circle): these symbols mean "there is an error here". I will usually explain what the error is, or the type of error, such as
  - arithmetic error,
  - algebra error,
  - functional notation error, etc.

I will often use an arrow to indicate that an error has occurred between two steps.

Grading Rubric for Tests
Questions are usually out of 10 or 20 marks, and I assign a point value with the following considerations in mind:

A-,A: Your solution. . .

- is conceptually correct,
- uses correct mathematical notation,
- is easy for a reader to follow (legible and well organized),
- has at most one small error.

B-,B,B+: Your solution. . .

- is conceptually correct,
- uses correct mathematical notation, but
- is difficult to follow, or
- has more than one small error, or
- has a single more significant error.

C-,C,C+: Your solution. . .

- is conceptually correct, but
- does not use correct mathematical notation, or
- there are missing details in the solution, or
- has multiple significant errors.

D,D+: Your solution. . .

- is a reasonably complete attempt at solving the problem, but
- is not conceptually correct, or
- does not use correct mathematical notation, or
- has multiple significant errors.

F: Your solution. . .

- does not use valid mathematics, or
- is substantially incomplete, or
- is not conceptually correct, or
- does not use correct mathematical notation, or
- has multiple significant errors.

A Healthy Learning Environment

- **Student Conduct.** In the discussion forums and email communications, please consider the tone of your writing. We must maintain a respectful, open environment if we hope to have effective forum discussions. Also, make sure to use correct grammar, spelling, and punctuation in all your electronic communications. The UMM Student Conduct Code is available at
  www1.umn.edu/regents/policies/academic/Student_Conduct_Code.pdf
- **Disability Accommodations.** Reasonable accommodations will be provided for students with disabilities on an individualized basis. The Disability Services Office will determine appropriate accommodations through consultation with the student. Please contact them directly.
  The UMM Disability Services Office website is at
  www.morris.umn.edu/services/dsoaac/dso/

- **Academic Integrity.** Cooperation is vital to your future success, which ever path you take. I encourage cooperation amongst students where ever possible, but the act of copying or other forms of cheating will not be tolerated. Academic dishonesty in any portion of the academic work for a course is grounds for awarding a grade of F or N for the entire course, although less severe penalties may also be imposed.
  The UMM Academic Integrity policy and procedures can be found at
  www.morris.umn.edu/Scholastic/AcademicIntegrity/
- **Mental Health.** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. If you have any special needs or requirements to help you succeed in the class, talk to me as soon as possible, or visit the appropriate University service yourself.

Topics Covered

- Linear Equations (P.1-P.4)
- Quadratic Equations (P.5 & P.6)
- Functions (1.2)
- Properties of 12 Basic Functions (1.3)
- Average Rate of Change
- Building Functions From Functions (1.4)
- Parametric Relations and Inverses (1.5)
- Graphical Transformations (1.6)
- Linear and Quadratic Functions (2.1)
- Power Functions (2.2)
- Polynomial Functions (2.3)
- Real Zeros of Polynomial Functions (2.4)
- Rational Functions (2.6)
- Solving Equations in One Variable (2.7)
- Solving Inequalities in One Variable (2.8)
- Exponential and Logistic Functions (3.1)
- Logarithmic Functions (3.3)
- Properties of Logarithmic Functions (3.4)
- Exponential and Logistic Modeling (3.2)

- Equation Solving (3.5)
- Angles and Their Measures (4.1)
- Trigonometric Functions of Acute Angles (4.2)
- Trigonometry: Circular Functions (4.3)
- Graphs of Sine, Cosine, and Sinusoids (4.4)
- Graphs of Tangent, Cotangent, Secant, and Cosecant (4.5)
- Inverse Trigonometric Functions (4.7)
- Solving Problems with Trigonometry (4.8)
- Fundamental Trigonometric Identities (5.1)
- Proving Trigonometric Identities (5.2)
- Sum and Difference Identities (5.3)
- Multiple Angle Identities (5.4)
- The Law of Sines and The Law of Cosines (5.5 & 5.6)
- Solving Systems of Equations (7.1)
- Sketching Circles, Ellipses and Hyperbolas (8.2 & 8.3)