

MAC1105

Sections: 14375, 14509, 14510, 14511

Basic College Algebra

Fall 24

I. General Information

Class Meetings

- This is an asynchronous online course. All lectures are pre-recorded and available in Canvas.

Instructors:

- Name: Sean Mandrick
- Office: Little Hall 405
- Office Hours: M5 (11:45am-12:35pm), T4 (10:40am-11:30am), R6 (12:50pm-1:40pm)
- Email: smandrick@ufl.edu

- Name: Alexander Wong
- Office: Little Hall 475
- Office Hours: M4 (10:40am-11:30am), T5 (11:45am-12:35pm), R7 (1:55pm-2:45pm)
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Course Description

In this course, students will develop problem solving skills, critical thinking, computational proficiency, and contextual fluency through the study of equations, functions, and their graphs. Emphasis will be placed on quadratic, exponential, and logarithmic functions. Topics will include solving equations and inequalities, definition and properties of a function, domain and range, transformations of graphs, operations on functions, composite and inverse functions, basic polynomial and rational functions, exponential and logarithmic functions, and applications.

This course is designed for students who intend to take a calculus course, either MAC2311 or MAC2233. It will prepare you for the Precalculus MAC1140 and MAC1147 courses, which will then lead to Calculus.

If you are taking this course for General Education Mathematics credit and you do not need Precalculus for your major or as preparation for Calculus, you should consider taking MGF1130. Please discuss your individual course needs with your college advisor.

Prerequisites

You must complete the ALEKS placement exam prior to registering for this course. This course assumes prior knowledge of intermediate algebra (Algebra 2) and the ability to do arithmetic without a calculator.

General Education Credit

- Mathematics

This course accomplishes the [General Education](#) objectives of the subject area listed above. A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Course Materials

This course uses an open-source textbook, which can be found at <https://openstax.org/details/college-algebra>. Purchasing a copy of the textbook is not required. Practice assignments will be completed in Xronos, an innovative online homework platform developed by the Ohio State University. Using this platform is completely free to students. Information on how to access Xronos will be available in Canvas.

E-Learning Canvas

Canvas is your main resource for this course. All class announcements, assignments, lecture outlines, lecture videos, and other information will be posted there. You can access Canvas by going to: <https://elearning.ufl.edu/> and then using your Gatorlink username and password to login.

Your grades for assignments will also be posted on Canvas. You are responsible for verifying that your grades are accurate. The instructors are always happy to discuss the content of an assignment, but grade issues must be dealt with in a timely manner.

Calculator Policy

A basic calculator will be provided on mastery quizzes. No other calculator or electronic device is allowed on mastery quizzes. A calculator will sometimes be needed to complete homework questions. Desmos: <https://www.desmos.com/scientific> is a good online calculator.

Success

Success in MAC1105 comes from your effort and attitude. Spending time and energy to complete the class materials is critical. Research has shown that it is more effective to do a small amount of math every day rather than a large amount in a single day.

Most of the learning you will do in this course will come from the work you do on the course assignments. Mathematics is not a spectator sport. Watching someone solve a problem is very different from being able to solve it yourself. To succeed you must be willing to practice until you can answer questions independently.

II. Student Learning Outcomes (SLOs)

At the end of this course:

- Students will solve an equation or an inequality using an appropriate technique.
- Students will define and describe functions, their properties, and graphs.
- Students will manipulate functions to simplify expressions and find new functions.
- Students will use transformations to write an equation for a function and to graph a function.
- Students will model and solve real world problems using functions.

At the end of this course, students will also be expected to have achieved the [General Education](#) learning outcomes as follows:

- **Content:** Students demonstrate competence in the terminology, concepts, theories, and methodologies used within the discipline. After completing this course students will be able to employ strategies in solving linear, exponential, and logarithmic equations, and inequalities, construct, define, and identify linear, quadratic, radical, rational, exponential, and logarithmic functions, analyze their properties, and perform basic algebraic operations on functions, apply synthetic division, evaluate basic limits, and construct and analyze the graphs of rational functions. (Content for Gen Ed Math, assessed through practice assignments, mastery quizzes, final exam).
- **Communication:** Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms appropriate to the discipline. Throughout this course students will formulate mathematical models using algebraic, exponential, and logarithmic functions and will communicate mathematical solutions clearly and effectively. (Communication for Gen Ed Math, assessed through practice assignments, mastery quizzes, final exam).
- **Critical Thinking:** Students analyze information carefully and logically from multiple perspectives, using discipline-specific methods, and develop reasoned solutions to problems. In this course, students will reason in abstract mathematical systems, and they will apply mathematical models using algebraic, exponential, and logarithmic functions to solve problems. They will also develop and solve mathematical models of real-world word problems. (Critical Thinking for Gen Ed Math, assessed through practice assignments, mastery quizzes, final exam).

III. Course Goals and Weekly Course Structure

Course Content and Goals

This course is designed to prepare students for MAC 1140 or MAC 1147. The course goals are broken down into two categories:

- I) **Core Modules:** The necessary concepts and skills required for success in MAC 1140 or MAC 1147. These Modules cover:
1. Real and Complex Numbers
 2. Linear Functions
 3. Linear Inequalities
 4. Quadratic Functions
 5. Radical Functions
 6. Polynomial Functions
 7. Rational Functions
 8. Logarithmic and Exponential Functions

This represents the necessary concepts and skills of College Algebra. After a review of the types of numbers we will encounter in the course, each Module explores a particular class of functions.

- II) **Advanced Modules:** Preparation for how concepts in this course can be used in various academic paths. These Modules will prepare you for Calculus or Biological Sciences.

A. This set is designed to prepare you for the first concept you will encounter in Calculus: Limits.

B. This set is designed to prepare you for modeling real-life phenomena using functions we explored in the Core Modules.

These sets build on the types of functions we explored in the Core Modules. They capture the two most common reasons students take MAC 1105. Students will only work on one of the two tracks.

Objectives for each Module are listed on the next pages.

Weekly Course Schedule

Week	Topics	Assignments
1	Module 1	
2	Modules 1 & 2	Practice Quiz (8/30)
3	Modules 2 & 3	Mastery Quiz 1 (9/6)
4	Modules 3 & 4	Mastery Quiz 2 (9/13)
5	Module 5	Mastery Quiz 3 (9/20)

Week	Topics	Assignments
6	Module 5	Make-up Quiz (9/27)
7	Module 6	Mastery Quiz 4 (10/4)
8	Module 7	Mastery Quiz 5 (10/11)
9	Module 8	Mastery Quiz 6 (10/21)
10	Modules 9A, 9B, 10A	Mastery Quiz 7 (10/25)
11	Module 10B & 11A	Mastery Quiz 8 (11/1)
12	Module 11B	Make-up Quiz (11/8)
13	Module 12A	Mastery Quiz 9 (11/15)
14	Module 12A	Mastery Quiz 10 (11/22)
15	Module 12 B & Review	Make-up Quiz (12/4)
		Final Exam (12/9)

Core Modules

Module 1 - Real and Complex Numbers

- Identify the subgroup of Real numbers a number belongs to.
- Identify the subgroup of Complex numbers a number belongs to.
- Apply the properties of Real numbers to simplify large expressions.
- Generalize the properties of the Real numbers to Add/Subtract/Multiply/Divide Complex numbers.

Module 2 - Linear Functions

- Construct linear functions using various information about the function.
- Translate between different forms (Point-Slope, Slope-Intercept, Standard) of a linear function.
- Translate between representations (equation, graph, description) of a linear function.
- Solve linear equations.

Module 3 - Linear Inequalities

- Translate between a written description and interval notation for linear inequalities.
- Convert between linear inequalities, graphs of linear inequalities, and their interval notation.
- Solve linear inequalities.

<p>Module 4 - Quadratic Functions</p> <ul style="list-style-type: none"> • Construct quadratic functions using various information about the function. • Translate between representations (equation, graph, description) of a quadratic function. • Translate between different forms (Vertex, Standard, and Factored) of a quadratic function. • Solve quadratic equations.
<p>Module 5 - Radical Functions</p> <ul style="list-style-type: none"> • Identify the domain of a radical function. • Translate between representations (equation, graph, description) of a radical function. • Solve radical equations.
<p>Module 6 - Polynomial Functions</p> <ul style="list-style-type: none"> • Identify the end behavior of a polynomial function (in factored form). • Identify the zero behaviors of a polynomial function (in factored form). • Translate between representations (equation, graph, description) of a polynomial function. • Construct lowest-degree polynomial functions given their zeros.
<p>Module 7 - Rational Functions</p> <ul style="list-style-type: none"> • Identify the domain of a rational function. • Translate between representations (equation, graph, description) of a rational function. • Solve rational equations.
<p>Module 8 - Logarithmic and Exponential Functions</p> <ul style="list-style-type: none"> • Identify the domain/range of logarithmic or exponential functions. • Translate between different forms (logarithmic and exponential) of an equation. • Utilize the properties of logarithmic functions to solve logarithmic equations. • Solve exponential equations with same or different bases.

Advanced Modules

Calculus	Biological Sciences
This set is designed to prepare you for the first concept you will encounter in Calculus: Limits.	This set is designed to prepare you for modeling real-life phenomena using functions we explored in the Core Modules.
<p>A9 – Operations on Functions</p> <ul style="list-style-type: none"> • Identify the domain after operating (+, \times, \div) on functions. • Evaluate the composition of two functions. • Recognize whether a function is 1-1 or not. • Solve for the inverse of a function, if it exists. 	<p>B9 – Modeling with Linear Equations</p> <ul style="list-style-type: none"> • Identify when a real-world situation would require a linear function. • Describe the domain on which the model is valid. • Construct a linear model equation for the real-life situation.

<p>A10 – Synthetic Division</p> <ul style="list-style-type: none"> • Apply synthetic division to divide two polynomials. • Describe the possible rational or integer roots of a polynomial. • Apply synthetic division to completely factor a polynomial. 	<p>B10 – Modeling with Power Equations</p> <ul style="list-style-type: none"> • Identify when a real-world situation would require a direct variation equation. • Identify when a real-world situation would require an inverse variation equation. • Construct a power model equation for the real-life situation.
<p>A11 – Introduction to Limits</p> <ul style="list-style-type: none"> • Describe what the limit of a function represents. • Evaluate the left or right limit of a function. • Evaluate the limit of a function. 	<p>B11 – Modeling with Log or Exponential Equations</p> <ul style="list-style-type: none"> • Identify when a real-world situation would require a logarithmic function. • Identify when a real-world situation would require an exponential function. • Construct a log/exp model equation for the real-life situation.
<p>A12 – Graphing Rational Functions</p> <ul style="list-style-type: none"> • Use limits to determine the holes of a rational function. • Use limits to determine the vertical asymptotes of a rational function. • Use limits to describe the horizontal asymptotes of a rational function. • Use limits to describe the oblique asymptotes of a rational function. 	<p>B12 – Solving Real-World Modeling Word Problems</p> <ul style="list-style-type: none"> • Determine the appropriate type of function to model the situation. • Construct a model equation for the real-life situation. • Solve the real-world modeling problem.

IV. Course Structure and Graded Work

Course Structure

Modules

The content of this course is divided into modules. There are eight core modules you must master to earn a C. Once you have completed these, there are two tracks of advanced modules available that you can choose between. Completing advanced modules is required to earn a grade higher than C.

Structure

This course is a mastery-based class, which means that you must show your mastery of a module before moving on to the next. Your grade in the course is determined by how many modules you master by the end of the semester.

Pacing

Unlike a traditional course, the class is mostly self-paced. You can take the time you need to practice and solidify your understanding. While there is no minimum pace, there is a maximum pace of two modules per week. Two new modules will open each week, but you do not need to complete them that week! You may proceed through them at your own pace, but you must complete the eight core modules to earn a passing course grade.

Lectures

Each module's content is covered in prerecorded lectures and the textbook. You should view and read the content before attempting any assignments.

Practice Assignments

After you have read and watched the content for a module, then you are ready for practice. Each module has an assignment of practice problems for you to complete in Canvas. These are the most important part of the course. Most of the learning you do will come from doing these practice problems. These assignments will assess your critical thinking and communication of the lecture content.

Mastery Quizzes

Once you have practiced it is time to show what you have learned! Each module has a mastery quiz that will unlock once when you finish the practice assignments. Mastery quizzes are proctored assessments that you must do on your own with no external help or resources. They are subject to the Student Honor Code.

- The mastery quiz for a topic will open a few days after the lecture and assignment.
- You don't have to be perfect to show mastery. A score of 80% is considered passing and sufficient to move on to the next topic.
- You may take a mastery quiz as many times as necessary, but after your third attempt you will need to contact your instructor to unlock more.
- Quizzes will be proctored using the Honorlock. To use Honorlock you will need a web cam, the Google Chrome browser, and an isolated space where you can take your test.
- You must remain in one location the entire time you are taking a quiz. Moving to a different location during a quiz is a violation of the assignment rules.
- You may have **only** your picture ID, a pen or pencil, and blank scratch paper with you during a quiz.
- A basic calculator will be provided by Honorlock. All electronic devices, including phones, must be put away. Using or possessing any such device during a quiz is a violation of exam rules, regardless of whether or how it is used.

Final Exam

This course will have a comprehensive final exam covering the content of the eight core modules. Your performance on the final can raise or lower your overall grade by 1/3 letter grade.

Extra Practice

In addition to the module assignments that you must complete, some modules will have extra practice assignments that utilize the Xronos software. These are not required, but will present you with different problem styles, perspectives, and complexity that can help increase your understanding.

Course Grade

This course is not graded like a traditional class.

- Your final grade in the course is primarily determined by the number of modules you master. There are 8 core modules you must master to earn a C.
- The final exam will be proctored like the mastery quizzes and assesses your critical thinking and communication of the lecture content.

Grading Scale

- **A** 8 core modules, 4 advanced modules
- **B** 8 core modules, 2 advanced modules
- **C** 8 core modules
- **D** 6 core modules
- **E** 5 or fewer core modules

Final Exam

Your performance on the final exam can raise or lower your grade by 1/3 letter grade.

- A score of 80% or higher on the final exam will raise your grade by 1/3 letter, so a B would become a B+.
- A score below 60% on the final exam will lower your grade by 1/3 letter, so a B would become a B-.

For information on how UF assigns grade points, visit: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

V. Policies

Attendance and Make-up Exam Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email, they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructors in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: <http://www.counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Free Help-The Little Hall Math Lab

In addition to attending your discussion section regularly and visiting the office hours of your instructor and teaching assistant, for help, the Little Hall Math Lab located in Little Hall 215 offers free drop-in assistance with math homework Monday through Friday from 9:30 to 4:00, as well as test reviews before each math exam and other resources. It is staffed by mathematics graduate students and undergraduate tutors. Please note that this space is not designed for intense one-on-one tutoring, but rather as a resource for quick questions and explanations. You should not expect the staff to help you if you have not at least begun your homework and have specific questions. Moreover, they absolutely will not assist you with quizzes or any other such work. More details are available here: <https://oas.aa.ufl.edu/students/tutoring/>

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

