

Ma 103
College Algebra
2020-21 Second Semester

INSTRUCTOR INFORMATION

Section: Ma 103-1
Time/Room: MTWF 10:00-10:50A.M., AI 314
Instructor: Mr. Charles Lacey
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Office Hours: MW 3:00-3:45 P.M. (via Teams)
T 9:00-9:50 A.M. (via Teams)
TH 1:00-1:45 P.M. (via Teams)
F 2:00-2:45 P.M. (via Teams)
Other times by appointment at <https://calendly.com/clacey-bju>

COURSE INFORMATION**Catalog Description**

Review of elementary algebra. Stress on the concept of relation and function, algebraic functions, and their graphs. 3 credits/3 load/4 class-meetings per week

Prerequisite

ACT score of 20–25, SAT score of 550–630, completion of STEM modules (090), or placement test

Textbook and Technology Requirements

- Textbook (required): Aufmann and Nation. *Algebra and Trigonometry*. 8th ed., Cengage, 2015. ISBN 978-1-285-44942-5
- Graphing Calculator (required): TI–83/84 is sufficient. (Note: Certain majors and almost all upper-level Ma courses require a TI-NSpire CAS or TI-89.)
- Microsoft Office Lens (recommended): a free app to convert handwritten work to PDF files
- Microsoft Teams (required): free app offering chat, collaboration, and conferencing

COURSE CONTEXT**Institutional Context**

This course supports the following goals of the institutional (IG), the BJU core (BJ), and the Division of Mathematical Science (MS):

- IG 3: To develop in students Christ-like character through disciplined, Spirit-filled living.
- IG 4: To direct students toward a biblical life view that integrates God's Truth into practical Christian living.
- IG 5: To prepare students to excel intellectually and vocationally by offering diverse academic programs rooted in biblical truth and centered on a liberal arts core.
- BJ 3c: Will equip students to understand the physical world as God's creation, as stewardship given to man, and as the physical expression of His glory
- BJ 4: Demonstrate critical thinking in analyzing, evaluating, and synthesizing information and ideas.
- BJ 5: Develop solutions to exercises, working independently, and with others, through critical and creative thinking.

- MS 5: Construct a foundation upon which they, after graduation, can continue the development of their God-given abilities and the learning necessary for their work and life.

Course Goals

This course is designed to

- CG 1: Ensure that students have the mathematical skills needed to be successful in everyday life. (IG 4, 5)
- CG 2: Demonstrate mathematics as a tool to analyze the order and design in the world around us. (BJ 3c)
- CG 3: Develop character traits such as self-discipline, organization, perseverance, and precision. (IG 3)
- CG 4: Develop sound thinking and reasoning skills. (BJ 4, 5)
- CG 5: Mature the student in the theory and application of mathematics. (MS 1)
- CG 6: Provide a foundation for other mathematics, science, or computer courses. (MS 5)

Course Objectives

	The students will be able to...	Course Goals	Course Content	Assessment
1.	Perform operations on polynomials	3, 5, 6	Unit 1a	HW, Quiz
2.	Factor polynomials	3, 4, 5, 6	Unit 1a	HW, Quiz
3.	Perform operations on rational numbers and expressions	1, 3, 5, 6	Unit 1a	HW, Quiz
4.	Solve linear equations and absolute value equations	1, 3, 5, 6	Unit 1a	HW, Test
5.	Perform operations on the set of complex numbers	2, 3, 5, 6	Unit 1b	HW, Quiz
6.	Solve quadratic equations	3, 5, 6	Unit 1b	HW, Test
7.	Derive the quadratic formula	4, 5, 6	Unit 1b	HW, Quiz
8.	Solve applications using linear and quadratic equations	1, 2, 4, 6	Units 1a, 1b	HW, Test
9.	Solve rational and radical equations	3, 5, 6	Unit 1b	HW, Test
10.	Solve inequalities	1, 3, 5, 6	Unit 1b	HW, Test
11.	Write and solve equations of variations and apply them to real-life settings	1, 2, 4, 6	Unit 1b	HW, Portfolio
12.	Use the Cartesian coordinate system and graph the basic family of functions	5, 6	Unit 2	HW, Quiz
13.	Derive the distance formula	4, 5, 6	Unit 2	HW, Quiz
14.	Apply the basic properties of functions to determine the shapes of graphs	4, 5, 6	Unit 2	HW, Quiz
15.	Use linear and quadratic functions to model real-life applications	2, 4, 6	Unit 2	HW, Portfolio
16.	Prove the Remainder Theorem and the Factor Theorem	3, 4, 5	Unit 3	HW, Quiz
17.	Use the Rational Zeros Theorem	3, 4, 5	Unit 3	HW, Test
18.	Use the theorems in Objectives 16 and 17 along with synthetic division and other tools to help factor polynomials	3, 4, 5	Unit 3	HW, Test
19.	Apply the theorems in Objectives 16 and 17 to help identify the asymptotes of rational functions and graph rational functions	3, 4, 5	Unit 3	HW, Test
20.	Describe characteristics of relations, functions, and inverse functions	1, 3, 6	Unit 4	HW, Quiz
21.	Derive inverse functions for one-to-one functions including exponential and logarithmic functions	3, 4, 5	Unit 4	HW, Test
22.	Evaluate exponential and logarithmic expressions	1, 6	Unit 4	HW, Quiz
23.	Use exponential and logarithmic functions to model real-life applications	2, 4, 6	Unit 4	HW, Portfolio
24.	Solve exponential and logarithmic equations	3, 4, 5, 6	Unit 4	HW, Test
25.	Defend or refute different viewpoints on the interconnections among mathematics, reality, philosophy, and world view.	2, 3, 4		Discussion Posts

COURSE ASSESSMENT AND GRADING

Activities and Assessment

The course grade will be based on performance in the following activities.

Category	% of Grade	Description
Preliminary Skills	6 % 60 pts	<ul style="list-style-type: none">• PS pre-quiz and assignment focusing on preliminary skills that are not contained in lectures or algebra skills that require extra practice (6, 10 points each)
Exercises	12 % 120 pts	<ul style="list-style-type: none">• Exercise Sets: Out-of-class exercises for each textbook section covered (30, 4 points each)
Writing and Application	8 % 80 pts	<ul style="list-style-type: none">• Application Portfolios: (4, 15 points each)<ul style="list-style-type: none">◦ Exercises applying algebra to interpret real-world scenarios◦ Derivations and proofs of important formulas and theorems• Discussion Boards: Read-post-respond discussions focusing on viewpoints of mathematics (4, 5 points each)
Quizzes	16-20 % ≈180 pts	<ul style="list-style-type: none">• Unit Quizzes: In-class, closed-book, 20-minute quizzes focusing on skills from the first half of each unit (5, 20 points each)• Theory Quizzes: In-class, closed-book, 15-minute quizzes focusing on theory for each unit (5, 10-15 points each)• Unannounced Quizzes: In-class quizzes focusing on skills (≤10, ≈5 points each)
Tests	38-42 % ≈400 pts	<ul style="list-style-type: none">• Unit Tests: In-class, closed-book, 50-minute tests focusing on higher-skills and applications from each unit (5, ≈80 points each)
Final Exam	15 % 150 pts	<ul style="list-style-type: none">• Final Exam: In-class, closed-book, multiple-choice, cumulative, 70-minute exam focusing on higher-order skills, theory, and application (1, 150 points)
Factoring		<ul style="list-style-type: none">• Failure to achieve an 80% or higher on the Factoring Quiz by the 12th week of class will result in a full letter grade being docked from the final class grade.

Preliminary Skills (PS)

Some preliminary mathematics skills that are essential for the understanding of College Algebra but are not part of the normal lecture sequence will be addressed in as Preliminary Skills sets.

Preliminary Skills will be addressed in the following manner.

- PS Pre-quiz: An opportunity to exempt the Preliminary Skills assignment will be given as a Canvas quiz (normally due on Friday night). The Pre-quiz evaluates the student's knowledge of a particular set of math skills. The Pre-quiz will be timed and is worth 10 points. Students scoring 8 or better on the Pre-quiz will be exempt from the corresponding PS assignment and will be excused from attending class on that PS day. Students who miss taking the Pre-quiz by the due date will receive a 0.
- PS Day: PS assignment which is due that evening via Canvas.
- PS Assignment: The PS assignment is designed to strengthen a particular set of math skills. It is normally due on Tuesday night and is worth 10 points; it is designed to strengthen a particular math skill.
- PS Attendance: attending the PS class is required unless the student scores above an 8 out of 10 on the PS Pre-quiz the previous week.
- PS Grading: The higher score from the PS Pre-quiz and the PS Assignment will be kept as the Preliminary Skill score for that set. The lower score will be dropped and will not affect the student's grade.

Homework

Because homework is one of the primary means by which students develop good mathematical habits, it is crucial to success in this course. Homework in mathematics includes more than just working *exercises*. Homework also includes reading and understanding how *examples* are worked, learning important *theory* (i.e., definitions, formulas and their derivations, and theorems and their proofs), and becoming proficient at using appropriate *technology*.

Submitting Homework: Most homework (besides reading) in this course will be handwritten rather than typed. Handwritten work must be neat and will be submitted as a PDF file via Canvas. *Microsoft Office Lens* is the recommended app for converting handwritten material into PDF files.

Exercise Sets are correlated with lectures include **Readings, Exercises, Application Exercises,** and **Worksheets**. Exercise Sets and their respective due dates are listed in the Course Schedule. **Exercises** (AKA Homework Assignments) are due via Canvas. They will be graded on completion and self-evaluation. One randomly selected exercise will be submitted per set.

- Exercises must be neat and well organized. Section numbers and page numbers should appear at the beginning of each new section.
- Exercises should be worked out in detail. Answers alone are not acceptable and will receive no credit.
- Exercises should be worked down the page, never across.
- The student is responsible for checking the answers to all exercises before turning in the assignment. Answers to odd-numbered exercises are in the back of the book. Answers to assigned even-numbered exercises are available in Canvas.
- The student must keep all completed exercises in an organized portfolio and be ready to turn in this physical portfolio at any time during the semester upon request of the instructor.

Applications Portfolio (AP)

Application Exercises are to be combined into one PDF file and are due via Canvas. Portfolios will be graded on completion, organization, explanation, and interpretation.

- See instructions for Exercises.

Discussion Boards (DB)

Discussion Board activities will be assigned in Canvas. These assignments will engage students in topics such as their personal math biography, a biblical worldview of mathematics, the history of math, and self-analysis of math skills. The goal of these assignments is to help students develop and articulate their view of how math fits into God's world in general and their lives specifically.

Late or Missing Assignments

- Assignments and Activities:
 - Students are expected to turn in assignments on time. Missing work will be given a grade of 0.
 - Even though assignments are collected on predetermined days, students are encouraged to complete and submit each assignment within a day or two of the lecture covering that material.
 - Assignments may be accepted late in extenuating circumstances only by instructor approval.
- Quizzes and Tests: Missed quizzes and tests may be made up only by instructor approval. Except in extenuating circumstances, late quizzes will be penalized 10 percent per day.

Grading Scheme

Final grades will be assigned according to a standard 10 percentage point scale calculated out of the total points available during the semester (≈1,000 pts). Percentages will be rounded to the nearest whole percentage when determining final grades.

Extra Credit

- Extra points are built into the course. No additional extra credit work will be granted.

OTHER

Presentation Standards

The goal is to develop a professional level of understanding of the course material. Students are expected to submit work that is professional, fluent, and clearly communicated.

- Tests/Quizzes/Assignments are not about what you know, but about what you can communicate about what you know – so the presentation of your work/logic should always be neat, orderly, clearly defined.
- Answers are to be presented as the logical conclusion of your work.
- Papers should not be submitted with “spiral”/ripped edges (clean edges are professional).
- Take-home tests (when time is not limited) should be neatly presented (rewritten, organized neatly, no scratchwork, just a final polished presentation)
- Solutions that are not professionally presented will be penalized 10 percent.

Tuesdays

Not every Tuesday will be required attendance for every student. Check the Course Schedule.

- Preliminary Skills Days: Students who pass the Preliminary Skills Quiz with an 8 or better will not be required to attend the following Preliminary Skills Day. Students who are not required to attend will not be counted absent.
- Lecture Days: Some Tuesdays will not be used for either Preliminary Skills. These Tuesdays will be required attendance for all students.

Classroom Decorum

The classroom is a professional environment. Students are expected to be respectful to their instructor and peers in behavior, attitude, attire, and use of technology. The instructor has the right to require students who are participating in distracting behavior to leave the class.

Attendance

- Students should notify the instructor by email as soon as possible after an absence (preferably within 24 hours).
- If the absence is planned, the student should notify the instructor before missing class.
- Absent students are personally responsible to obtain notes from classmates.
- BJU attendance policy is in effect (see <https://home.bju.edu/bju-policies/> for details).

Academic Honesty and Integrity Policy

BJU's **academic honesty and integrity** policy is in effect (see <https://home.bju.edu/bju-policies/> for details).

Copyright Policy

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Tentative Course Schedule

Date	Lect.	Class Content	Text.	Assignments	Due
Unit 1 Algebraic Expressions and Equations (Chapters P and 1)					
Jan 13, Wed	1.0a	Polynomials, Operations, and Applications	P.3	Pre-quiz 1 Set 1.0a	1/14 1/15
Jan 15, Fri	1.0b	Factoring Polynomials	P.4	Set 1.0b	1/19
Jan 18, Mon	PS.1	MLK Jr. Day		PS.1	1/18
Jan 19, Tue	1.0c	More Factoring	P.4	Set 1.0c	1/20
Jan 20, Wed	1.0d	Rational Expressions	P.5	Set 1.0d	1/22
Jan 22, Fri	1.0e	Quiz 1a (over 1.0a-1.0d) LCDs and Addition of Rational Expressions	P.5	Set 1.0e Pre-quiz 2 DB "My Math Bio"	1/25 1/22 1/22
Jan 25, Mon	1.0f	More Rational Expressions	P.5	Set 1.0f	1/26
Jan 26, Tue	PS.2	Preliminary Skills		PS.2	1/26
Jan 27, Wed	1.1	Linear and Absolute Value Equations	1.1	Set 1.1	1/29
Jan 29, Fri	1.2a	Applications from Geometry and Finance	1.2	Set 1.2 Pre-quiz 3	2/2 1/29
Feb 1, Mon	1.2b	Applications in Motion, Mixture, and Work	1.2	Set 1.2 (cont)	2/2
Feb 2, Tue	PS.3	Preliminary Skills		PS.3	2/2
Feb 3, Wed		Day of Rest			
Feb 5, Fri		Factoring Quiz		DB "Historical Perspective"	2/5
Feb 8, Mon		Unit 1a Theory Quiz Unit 1a Review			
Feb 9, Tue		Unit 1a Test (over 1.0d-1.2b)			
Feb 10, Wed	1.3a	Complex Numbers	P.6	Set 1.3a Factoring Assignment 1	2/12 2/12
Feb 12, Fri	1.3b	Quadratic Equations	1.3	Set 1.3b	2/15
Feb 15, Mon	1.3c	More Quadratic Equations	1.3	Set 1.3c	2/16
Feb 16, Tue	1.4a	Other Types of Equations	1.4	Set 1.4	2/23
Feb 17, Wed		Bible Conference			
Feb 19, Fri		Bible Conference		Pre-quiz 4	2/19
Feb 22, Mon	1.4b	More Types of Equations	1.4	Set 1.4 (cont) Factoring Assignment 2	2/23 2/23
Feb 23, Tue	PS.4	Preliminary Skills		PS.4	2/23
Feb 24, Wed	1.6	Applications with Variation	1.6	Set 1.6	2/26
Feb 26, Fri		Unit 1b Quiz (over 1.3a-1.4b) Intro to 1.5 Inequalities	1.5	Set 1.5	3/2
Mar 1, Mon	1.5	Inequalities	1.5	Set 1.5 (cont) Factoring Assignment 3	3/2 3/2
Mar 2, Tue		Unit 1b Theory Quiz Unit 1b Review			
Mar 3, Wed		Unit 1b Test (over 1.3a-1.5b)		AP.1	3/3
Mar 5, Fri	2.1	Introduction to 2-D Graphs	2.1	Set 2.1 DB "Worldview"	3/8 3/5
Unit 2 Basic Functions and Graphs (Chapter 2)					
Mar 8, Mon	2.2	Introduction to Functions	2.2	Set 2.2 Factoring Practice 4	3/10 3/10
Mar 9, Tue		Day of Rest			

Tentative Course Schedule

Date	Lect.	Class Content	Text.	Assignments	Due
Mar 10, Wed	2.3	Linear Functions	2.3	Set 2.3	3/12
Mar 12, Fri	2.4	Quadratic Functions	2.4	Set 2.4	3/15
Mar 15, Mon		Unit 2 Quiz (over 2.1-2.3) Factoring Quiz (2 nd attempt)			
Mar 16, Tue	2.5	Properties of Graphs	2.5	Set 2.5	3/17
Mar 17, Wed	2.6	Algebra of Functions	2.6	Set 2.6	3/19
Mar 19, Fri		Unit 2 Theory Quiz Unit 2 Review			
Mar 22, Mon		Unit 2 Test (over 2.1-2.6)		AP.2	3/22
Mar 23, Tue	2.7	Modeling Data Using Regression	2.7	Set 2.7	3/24
Unit 3 Higher-order Functions and Graphs (Chapter 3)					
Mar 24, Wed	3.1	Reducing Polynomials	3.1	Set 3.1	3/29
Mar 26, Fri		<i>Day of Rest</i>		Pre-quiz 5	3/26
Mar 29, Mon	3.2	Higher-Degree Polynomials	3.2	Set 3.2	3/31
Mar 30, Tue	PS.5	Preliminary Skills		PS.5	3/30
Mar 31, Wed	3.3	Zeros of Polynomial Functions	3.3	Set 3.3	4/2
Apr 2, Fri	3.4	Fundamental Theorem of Algebra	3.4	Pre-quiz 6 Set 3.4	4/2 4/5
Apr 5, Mon		Unit 3 Quiz (over 3.1-3.3)			
Apr 6, Tue	PS.6	Preliminary Skills		PS.6	4/6
Apr 7, Wed	3.5	Rational Functions	3.5	Set 3.5	4/13
Apr 9, Fri		<i>Day of Rest</i>			
Apr 12, Mon	3.5	More about Rational Functions	3.5	Set 3.5 (Cont)	4/13
Apr 13, Tue		Unit 3 Theory Quiz Unit 3 Review			
Apr 14, Wed		University Service Day			
Apr 16, Fri		Unit 3 Test (over 3.1-3.5)		AP.3	4/16
Unit 4 Exponential and Logarithmic Functions (Chapter 4)					
Apr 19, Mon	4.1	Inverse Functions	4.1	Set 4.1	4/20
Apr 20, Tue	4.2,3	Exponential and Logarithmic Functions	4.2,3	Sets 4.2 and 4.3	4/21
Apr 21, Wed	4.4	Properties of Logarithms	4.4	Set 4.4	4/23
Apr 23, Fri		Unit 4 Quiz (over 4.1-4.3)			
Apr 26, Mon	4.5	Exponential and Logarithmic Equations	4.5	Set 4.5	4/27
Apr 27, Tue		Unit 4 Theory Quiz Unit 4 Review			
Apr 28, Wed		Unit 4 Test (over 4.1-4.5)		AP.4	4/28
Apr 30, Fri		Course Conclusion		DB "In Conclusion"	4/30
Final Exam					
May 4, Tue		Ma 103-1 Final Exam 9:30-10:40am			

Note: This Course Schedule is tentative and is subject to change. Changes will be announced in class and/or reflected in Canvas.