



MAE 6654

**Teaching Technology-Enhanced Algebra in the
Secondary Grades**

84949 001

Fall 2026

Instructor Name

Karina K. R. Hensberry

University Course Description

Develops algebraic thinking appropriate for secondary grades teachers using technology. Topics include fundamental concepts in algebra. The framework used in the course will develop a teacher's technological pedagogical content knowledge.

Course Requisites

Prerequisite(s):

Corequisite(s):

Course Format

This course is hybrid format. That means the majority of course activities and assignments are designed to be completed online and asynchronously, but we will have some in-person meetings. There is also one assignment that may require you to implement an Algebra lesson/activity with students.

- *Module 0: Getting Started and Introduction to Algebra and Algebraic Thinking* serves as an introductory module that will help you get oriented in the course and also develop background regarding important topics such as the importance of Algebra, the development of Algebraic thinking, and some history of Algebra Education.
- *Modules 1-6* focus on building content knowledge and pedagogical content knowledge of important topics in Algebra at the secondary level. Each of these modules will take about 2 weeks to complete and will generally follow the following sequence: *Module Overview* → *Algebra Reading Quiz* → *Algebra Homework* → *Teaching and Learning Algebra with Technology Exploration* → *Read & Reflect* → *Discussion* → *Exit Ticket*.
- *Module 7* serves as a placeholder for you to take the Final Exam and submit final assignments, including the Article Reflection Journal and Lesson Plan Reflection.
- Some modules include additional assignments (Article Reflection Journal entries, and the various components of the Algebra Lesson Plan Project).

Please see the schedule for further details.

Student Learning Outcomes

By the end of this course, you will be able to:

- **Explain** the significance of algebra as a foundational domain in mathematics and determine how it supports secondary students in understanding real-world phenomena, including social, economic, and environmental contexts.
- **Discuss** the development of algebraic reasoning in students and its implications for teaching and learning, providing examples and evidence to support your points.
- **Solve** problems conceptually, with and without technology, related to key topics in Algebra I and II, including:
 - Algebraic notation, symbols, expressions, equations, inequalities, and proportional relationships, and their application in modeling and interpreting relationships.
 - Patterns of change in linear, quadratic, polynomial, and exponential functions, as well as proportional and inversely proportional relationships, and their applications in real-world scenarios.
 - Functional representations (e.g., tables, graphs, equations, descriptions, recursive definitions, and finite differences) and their use in analyzing relationships and constructing new functions.
 - Various function classes (e.g., polynomial, exponential, logarithmic, absolute value, rational, periodic, and discrete) and how parameter

choices influence specific cases and their applications in modeling real-world situations.

- **Demonstrate** effective instructional strategies for teaching algebra content conceptually, incorporating technology as appropriate.
- **Develop and deliver** a standards-based Algebra lesson plan that integrates elements of science, technology, engineering, and/or art, aligning with secondary students' needs and curricular goals.

Course Objectives

Through this course, the instructor will:

1. **Develop participants' conceptual understanding of secondary algebra** by engaging them in mathematical investigations, problem solving, and discussions centered on key algebraic ideas.
2. **Model research-based instructional practices** that promote algebraic reasoning, conceptual understanding, mathematical discourse, and productive struggle in secondary mathematics classrooms.
3. **Provide opportunities to explore and evaluate technology-enhanced instructional strategies** that support students' understanding of algebraic concepts and strengthen teachers' technological pedagogical content knowledge (TPACK).
4. **Facilitate connections among multiple representations of algebraic ideas**, including symbolic, graphical, numerical, verbal, and contextual representations, to deepen mathematical understanding.
5. **Engage participants in analyzing current research and professional literature** related to algebra teaching and learning, encouraging reflection on implications for classroom practice.
6. **Support the design, implementation, and reflection of standards-based algebra instruction** through authentic lesson planning, classroom application, peer feedback, and reflective practice.
7. **Promote collaboration and professional discourse** through structured discussions, peer review, and shared examination of instructional decisions and student thinking.
8. **Encourage participants to connect algebraic concepts to meaningful real-world contexts and interdisciplinary applications**, including STEAM-based instructional experiences where appropriate.

Required Texts and/or Readings and Course Materials

The following books are required and available through the USF library as an eBook:

- Sultan, A., & Artzt, A. F. (2017). *The mathematics that every secondary school math teacher needs to know (2nd ed.)*. Routledge.

The following books are required and can be purchased from the NCTM website as electronic PDFs for \$13. You need to search for the one that indicates “Download.”

- De Araujo, Z., Dougherty, B. J., & Zenigami, F. (2018). *Putting essential understanding of expressions and equations into practice in grades 6–8*. National Council of Teachers of Mathematics.
- Cooney, T. J., Beckmann, S., Lloyd, G. M., & Wilson, P. S. (2010). *Developing essential understanding of functions for teaching mathematics in grades 9–12*. National Council of Teachers of Mathematics.
- Ronau, R., Meyer, D., Crites, T., & Dougherty, B. (2014). *Putting essential understanding of functions into practice in grades 9–12*. National Council of Teachers of Mathematics.

How to Succeed in this Course

This 16-week course consists of 7 instructional modules. At the conclusion of each module, review the next one and carefully note the assignments and deadlines. Be sure to read the textbook and assigned articles thoroughly. Depending on your familiarity with algebra, you may need to allocate extra time to fully absorb and process the key concepts. To make your learning more impactful, keep your students in mind as you engage with the readings and assignments. If you have questions or face challenges meeting a deadline, please don't hesitate to reach out to me. I am fully committed to your success and am here to provide support when you need it.

Grading Scale

The purpose of this course, as with all education, is to learn – not just to “work for a grade.” While all students should be capable of earning an A in the course, merely completing the work does not constitute A work. Instead, the final determination of a course grade relies primarily on the **quality** of work presented for the various assignments.

Grade	Percent
A	93 – 100
A-	90 – 92
B+	87 – 89

Grade	Percent
B	83 – 86
B-	80 – 82
C+	77 – 79
C	70 – 76
D	60 – 69
F	0 – 59

Grade Categories and Weights

Graded Items	Percent of Final Grade
Algebra Lesson Plan Project	25%
Journal Article Summary	12%
Final Exam	10%
Reading Quizzes (x6)	12%
Homework (x6)	12%
Read & Reflect (x6)	12%
Exit Tickets (x8)	8%
Discussion Posts (x6)	9%

Instructor Feedback Policy & Grade Dissemination

I will respond to e-mail communication relevant to the subject matter within 48 hours of the date received. I will provide feedback on assignments in a timely manner. You can access your scores at any time using "Grades" in Canvas.

Major Topics and Course Schedule

Unless otherwise indicated, assignments are due at 11:59PM on the day listed.

In-person sessions will be from 5PM to 7:45PM, location TBD (Tampa campus).

Due Date	Module & Topics	Assignments
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9/02	Aug 24-Sept 2 <u>Module 0</u>: Getting Started & Introduction to Algebra and Algebraic Thinking <i>*In person session 08/27*</i>	• M0: Syllabus Quiz (First Day Attendance Requirement - Due 8/28) • M0: Get-to-know-you Survey (Due 8/28) • M0: Introduce Yourself • M0: Exit Ticket
9/16	Sept 3-16 <u>Module 1</u>: Theory of Equations: Polynomial Basics	• M1: Reading Quiz • M1: Homework • M1: Teaching and Learning Alg with Technology Exploration • M1: Discussion • M1: Read & Reflect • M1: Exit Ticket
09/30	Sept 17-30 <u>Module 2</u>: Theory of Equations: Quadratic Formula	• M2: Reading Quiz • M2: Homework • M2: Teaching and Learning Alg with Technology Exploration • M2: Discussion • M2: Read & Reflect • M2: Exit Ticket • M2: Lesson Plan Outline
10/14	Oct 1-14 <u>Module 3</u>: Building the Real Number System: Exponents <i>*In person session 10/01*</i>	• M3: Reading Quiz • M3: Homework • M3: Teaching and Learning Alg with Technology Exploration • M3: Discussion • M3: Read & Reflect • M3: Exit Ticket • M3: Lesson Plan Draft • M3: Lesson Plan Peer Feedback (due 10/21)

10/28	Oct 15-28 <u>Module 4</u>: Building the Real Number System: Inequalities Optional: Implement Lesson Plan	• M4: Reading Quiz • M4: Homework • M4: Teaching and Learning Alg with Technology Exploration • M4: Discussion • M4: Read & Reflect • M4: Exit Ticket • M4: Final Lesson Plan
11/11	Oct 29-Nov 11 <u>Module 5</u>: Functions and Modeling: Functions <i>*In person session 11/05*</i> USF Closed 11/11 Optional: Implement Lesson Plan	• M5: Reading Quiz • M5: Homework • M5: Teaching and Learning Alg with Technology Exploration • M5: Discussion • M5: Read & Reflect • M5: Exit Ticket
11/26	Nov 12-25 <u>Module 6</u>: Functions and Modeling: Matrix Operations Optional: Implement Lesson Plan	• M6: Reading Quiz • M6: Homework • M6: Teaching and Learning Alg with Technology Exploration • M6: Discussion • M6: Read & Reflect • M6: Exit Ticket
12/03	Nov 25-Dec 3 <u>Module 7</u>: Wrap Up <i>*In person session 12/03*</i>	• M7: Final Exam • M7: Algebra Lesson Plan Pro, Reflection • M7: Algebra Lesson Plan Pro, Presentation • M7: Article Reflection Journal • M7: Exit Ticket

* Note: The Schedule is subject to revision.

USF Core Syllabus Policies

USF has a set of central policies related to student recording class sessions, academic integrity and grievances, student accessibility services, academic disruption, religious

observances, academic continuity, food insecurity, pregnancy and related conditions, and sexual harassment that **apply to all courses at USF**. Be sure to review these online:

<https://www.usf.edu/provost/faculty-success/resources-policies-forms/core-syllabus-policy-statements.aspx>

Student Recordings

Florida Statute 1004.097 Free Expression on Campus

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal, educational use (USF Policy 10-048). A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach enrolled students about a particular subject. Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, private conversations between students in the class or between a student and the faculty member is prohibited. Recordings may not be used as a substitute for class participation and class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the USF Student Conduct Code.

Course Policies: Grades

Late Work Policy

All assignments, tasks, etc., must be completed by the due date. Only assignments submitted complete and on time will be considered for full credit. If there is a problem, it is helpful to talk with me before it becomes a crisis. Points will be deducted for late assignments in the following manner:

- 10% of all points of the assignment are deducted if submitted one day late.
- 20% of all points of the assignment are deducted if submitted no more than one week past the due date.
- An additional 10% will be lost each week thereafter.

Assignments more than one week late will not be accepted without prior approval from the instructor. That said, if you are struggling to submit

assignments, please contact your instructor as soon as possible so you can make a plan to get on track.

Grades of "Incomplete"

An Incomplete grade ("I") is exceptional and granted at the instructor's discretion only when students are unable to complete course requirements due to illness or other circumstances beyond their control. The course instructor and student must complete and sign the "I" Grade Contract Form that describes the work to be completed, the date it is due, and the grade the student would earn factoring in a zero for all incomplete assignments. The due date can be negotiated and extended by student/instructor as long as it does not exceed two semesters for undergraduate courses and one semester for graduate courses from the original date grades were due for that course. An "I" grade not cleared within the two semesters for undergraduate courses and one semester for graduate courses (including summer semester) will revert to the grade noted on the contract.

Campus Free Expression

It is fundamental to the University of South Florida's mission to support an environment where divergent ideas, theories, and philosophies can be openly exchanged and critically evaluated. Consistent with these principles, this course may involve discussion of ideas that you find uncomfortable, disagreeable, or even offensive.

In the instructional setting, ideas are intended to be presented in an objective manner and not as an endorsement of what you should personally believe. "Objective" means that the idea(s) presented can be tested by critical peer review and rigorous debate, and that the idea(s) is supported by credible research.

In this course you may be asked to engage with complex ideas and to demonstrate an understanding of the ideas. Understanding and engaging with an idea does not require you to believe it or to agree with it.

Course Policies: Technology and Media

Email Please use course instructor email as a primary form of professional communication (outside of class). Please be advised that all communication is expected to be conveyed in professional form.

Canvas This course will be offered via USF's learning management system (LMS), Canvas. If you need help learning how to perform various tasks related to this course or other courses being offered in Canvas, please view the following videos or consult the Canvas help guides. You may also contact USF's IT department at (813) 974-1222 or help@usf.edu.

Laptop Usage Generally, laptops may be utilized during class sessions as a tool for classroom instructional enhancement. However, it is expected that laptops screens are down when engaging in class discussion and activities.

Phone Usage It is expected that phones are not used during class session for making calls, texting, or posting on social media. Phone usage during class is limited to educational purposes (e.g., class polling apps or virtual manipulatives).

TEAMS Recordings In this class, software may be used to record live class lectures and discussions. As a student in this class, your participation in live class discussions may be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor.

Course Policies: Student Expectations

Health and Wellness

Your health is a priority at the University of South Florida. We encourage members of our community to look out for each other and to reach out for help if someone is in need. If you or someone you know is in distress, please make a referral at www.usf.edu/sos so that the Student Outreach & Support can contact and provide helpful resources to the student in distress. A 24-hour licensed mental healthcare professional, offered through the counseling center, is

available by phone at 813-974-2831, option 3. Please remember that asking for help is a sign of strength. In case of emergency, please dial 9-1-1.

Title IX Policy

USF is committed to fostering a safe and respectful learning environment, free from sex discrimination and sexual harassment, in accordance with Title IX and USF Policy 0-004. If a student shares an experience of sexual harassment, sexual assault, stalking, or relationship violence with a USF employee (including faculty), that employee will notify the Title IX Office. This allows the Title IX Office to send the student an email with information about support resources and options—if it is safe to do so. Students are not required to respond to this email. The Title IX Office is a private resource. Information is shared only on a need-to-know basis to provide students with support measures. To speak to a confidential resource, students may contact USF Center for Victim Advocacy at 813-974-5757. Confidential resources do not notify the Title IX Office unless the student requests it. For more information about Title IX, available resources, or to make a report, please visit www.usf.edu/title-ix.

Course Hero / Chegg Policy

The USF Policy on Academic Integrity specifies that students may not use websites that enable cheating, such as by uploading or downloading material for this purpose. This does apply specifically to Chegg.com and CourseHero.com – almost any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

Professionalism Policy

Per university policy and classroom etiquette; mobile phones, iPods, etc. must be silenced during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade.

Turnitin.com

In this course, turnitin.com may be utilized. Turnitin is an automated system which instructors may use to quickly and easily compare each student's assignment with billions of web sites, as well as an enormous database of student papers that grows with each submission. Accordingly, you may be expected to submit all assignments in both hard copy and electronic format. After the assignment is processed, as instructor I receive a report from turnitin.com that states if and how another author's work was used in the assignment. For a more detailed look at this process visit <http://www.turnitin.com>.

Netiquette Guidelines

- Act professionally in the way you communicate. Treat your instructors and peers with respect, the same way you would do in a face-to-face environment. Respect other people's ideas and be constructive when explaining your views about points you may not agree with.
- Be sensitive. Be respectful and sensitive when sharing your ideas and opinions. There will be people in your class with different linguistic backgrounds, political and religious beliefs or other general differences.
- Proofread and check spelling. Doing this before sending an email or posting a thread on a discussion board will allow you to make sure your message is clear and thoughtful. Avoid the use of all capital letters, it can be perceived as if you are shouting, and it is more difficult to read.
- Keep your communications focused and stay on topic. Complete your ideas before changing the subject. By keeping the message on focus you allow the readers to easily get your idea or answers they are looking for.
- Be clear with your message. Avoid using humor or sarcasm. Since people can't see your expressions or hear your tone of voice, meaning can be misinterpreted.

Email and Discussion Board Guidelines

- Use the subject line effectively by using a meaningful line of what your email or discussion is about.
- Keep your emails and postings related to the course content. You should not post anything personal on a discussion board unless it is requested by the instructor.
- Any personal, course or confidential issues should be directly communicated to the instructor via email. The discussion boards are public spaces; therefore, any issues should not be posted there.

End of Semester Student Evaluations

All classes at USF make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

Food and Drink Policy (for in-campus sessions only).

Please adhere to the firm policy of no beverages (other than bottled/capped water), food, tobacco products, or like items in the classroom. Your understanding of the necessity for this policy and cooperation will be greatly appreciated. This policy will be strictly enforced.

Learning Support and Campus Offices

Academic Accommodations

Students with disabilities are responsible for registering with Student Accessibility Services (SAS) in order to receive academic accommodations. For additional information about academic accommodations and resources, you can visit the SAS website.

[SAS website for the Tampa campus and Sarasota-Manatee Teachout site.](#)

[SAS website for the St. Pete campus.](#)

Academic Support Services

The USF Office of Student Success coordinates and promotes university-wide efforts to enhance undergraduate and graduate student success. For a comprehensive list of academic support services available to all USF students, please visit the [Office of Student Success website.](#)

Canvas Technical Support

If you have technical difficulties in Canvas, you can find access to the Canvas guides and video resources in the “Canvas Help” page on the homepage of your

Canvas course. You can also contact the help desk by calling 813-974-1222 in Tampa or emailing help@usf.edu.

[USF IT Services](#)

Center for Victim Advocacy

The [Center for Victim Advocacy](#) empowers survivors of crime, violence, or abuse by promoting the restoration of decision making, by advocating for their rights, and by offering support and resources. Contact information is available online.

Counseling Center

The Counseling Center promotes the wellbeing of the campus community by providing culturally sensitive counseling, consultation, prevention, and training that enhances student academic and personal success. Contact information is available online.

[Counseling Center website for the Tampa campus and Sarasota-Manatee Teachout site.](#)

[Counseling Center website for the St. Pete campus.](#)

Tutoring

The Tutoring Hub offers free tutoring in several subjects to USF undergraduates. Appointments are recommended, but not required. For more information, email asctampa@usf.edu.

[Tutoring website for the Tampa campus and Sarasota-Manatee Teachout site.](#)

[Tutoring website for the St. Pete campus.](#)

Writing Studio

The Writing Studio is a free resource for USF undergraduate and graduate students. At the Writing Studio, a trained writing consultant will work individually with you, at any point in the writing process from brainstorming to editing. Appointments are recommended, but not required. For more information or to make an appointment, email: writingstudio@usf.edu.

[Writing studio website for the Tampa campus and Sarasota-Manatee Teachout Site.](#)

[Writing studio website for the St. Pete campus.](#)

Student Ombuds Office

Florida Statute 1006.51 and Florida Board of Governors Regulation 6.011 require that all public institutions provide ombuds services to students. The Student Ombuds Office at USF is a confidential, impartial, informal, and independent resource for students experiencing challenges related to the university. Ombuds can help students safely explore options, clarify processes, and consider next steps. [Learn more or make an appointment at usf.edu/student-ombuds.](https://usf.edu/student-ombuds)