MAE 6650 Technology Enhanced Numerical Analysis in the Secondary Grades

CRN, Section #, 3

COURSE SYLLABUS

Semester: Spring 2026
Dates: 01/12/2026- 05/07/2026
Delivery method: Online, Off-campus
Location: Online / Off-campus
Instructor: Karina Hensberry
Instructor email: khensberry@usf.edu
Virtual Office Hours: By appointment via Microsoft Teams

Minimum Technical Skills & Requirements: In order to take courses online at USF, you will need to be able to demonstrate proficiency at basic computer skills, maintain reliable internet access, and meet the computer system requirements listed at: University of South Florida Information Technology – Remote Resources

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- **University Course Description**
  Examines descriptive analyses of numerical data and probability concepts appropriate for teaching secondary grades mathematics using technology.

- **Course Prerequisites**
  None.

- **Course Purpose**
  This course prepares secondary mathematics teachers (grades 6–12) to teach data analysis, probability, and introductory statistics using technology. Teachers will strengthen their content knowledge while developing pedagogical strategies that align with NCTM Standards and the GAISE II framework. Specifically, teachers will explore the GAISE II framework, statistical problem-solving, probability, and inference, while designing technology-enhanced tasks for grades 6–12.

- **Instructor Contact Information and Communication**
  Feel free to call me by my first name, with or without the "Dr." in front of it. I really do not mind…whatever you are most comfortable with. Some of my students call me Karina, but most of my students prefer to call me Dr. H. It is totally up to you.

The best way to reach me is via Canvas message (preferred) or USF email (khensberry@usf.edu).My goal is to reply to student emails within 24 hours but if you email me after 5pm on Friday or during the weekend, I may not be able to reply until the following Monday. If you need to reach me ASAP, send me a text message to my cell (352-359-8417) and I will get back to you.

I will communicate to the class through the Canvas announcement feature so ***make sure you are receiving email notifications from Canvas, and you check Canvas and your USF email daily during our course.***

- **First Day Attendance Policy**
  During the first week of classes, you will be expected to complete Module 0: Getting Started. At the beginning of this module, you will be introduced to the course, including assignments, schedule, and expectations and will be requested to take a short "syllabus quiz." This important quiz helps satisfy the "First Day Attendance" policy for this online course. It will let me know that you are indeed enrolled and participating in the course and that you have read the course syllabus, assignments, and rubrics. **Please note that if you do not complete the syllabus quiz by midnight of Wednesday, January 14, you run the risk of being dropped from the course.**

- **How to Succeed in this Course**
  This 16-week course consists of 8 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 data analysis, probability, and statistics, 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.

- **Course Structure**
  The vast majority of course activities and assignments are designed to be completed online and asynchronously. There is one culminating assignment that will require you to design and submit a technology-enhanced statistical investigation that could be implemented with secondary students.
  Module 0: Getting Started and Introduction to Statistics Education serves as an orientation module that helps you get familiar with the course structure, technology tools, and the importance of teaching statistics and probability in the secondary classroom. You will also review the GAISE II framework and reflect on your own experiences with data and probability.
  Modules 1–7 focus on building content knowledge and pedagogical content knowledge of important topics in statistics and probability at the secondary level, with an emphasis

on using technology to deepen understanding and support classroom instruction. Each of these modules generally follows the sequence:
Module Overview → Assigned Readings → Technology Exploration/Simulation → Practice Assignment or Data Activity → Discussion→ Exit Ticket.

- *Module Overview:* Introduces the module's focus and learning outcomes.
- *Assigned Readings:* Provide theoretical background and teaching strategies.
- *Technology Exploration/Simulation:* Use tools like CODAP, Desmos, Google Sheets, or Excel.
- *Practice Assignment/Data Activity:* Apply key concepts (e.g., survey design, regression, probability simulations).
- *Discussion:* Share insights, surface misconceptions, and engage with peers.
- *Exit Ticket:* A reflection or short report to connect learning to classroom practice and the GAISE II framework.

Special Modules:

- *Module 0:* Course Introduction/Orientation + Introductions
- *Modules 1–7:* Content + pedagogy development using the above sequence (with some modules including additional assignments that are part of the lesson plan project)
- *Module 8:* Capstone Project (no new readings, synthesis only).

- **Course Objectives**
  By the end of the course, you will:

  - Understand and apply the GAISE II statistical problem-solving framework.
  - Use technology to explore, represent, and analyze numerical and categorical data.
  - Demonstrate fluency with descriptive statistics, probability concepts, and introductory inferential reasoning.
  - Design and critique classroom investigations and simulations that develop statistical thinking.
  - Integrate technology meaningfully into lessons to enhance student learning.
  - Develop strategies for fostering engagement and critical thinking in teaching statistics.

- **Student Learning Outcomes**
  By the end of this course, you will be able to:
  - **Design** and **carry out** classroom-appropriate data collection activities.
  - **Create** and **interpret** graphical and numerical summaries using technology.
  - **Analyze** and **model** bivariate data using correlation and regression tools.
  - **Apply** probability concepts and simulations to illustrate randomness and variability.
  - **Explain** and **demonstrate** the concept of sampling variability and its role in inference.
  - **Develop** lesson plans that integrate technology to support student learning of data and probability.

- **Evaluate and Articulate** your teaching practice and articulate a vision for technology-enhanced statistics education.

- **Required Texts and/or Readings and Course Materials**

Bargagliotti, A. E., Franklin, C. A., Arnold, P., Gould, R., & Johnson, S. (2020). *Statistics and data science for teachers*. American Statistical Association. ISBN: 9781733594009

Franklin, C. A., Bargagliotti, A. E., Case, C., Kader, G., Scheaffer, R., & Spangler, D. (2020). *GAISE II: Guidelines for assessment and instruction in statistics education, pre-K–12*. American Statistical Association.

- **Supplementary (Optional) Texts and Materials**

Unless otherwise indicated, all materials in Canvas are required.

- **Grading Scale**

Grading Scale (%)

94 – 100	A	74 – 76	C
90 – 93	A-	70 – 73	C-
87 – 89	B+	67 – 69	D+
84 – 86	B	64 – 66	D
80 – 83	B-	60 – 63	D-
77 – 79	C+	0 – 59	F

- **Grade Categories and Weights**

Graded Items	**Percent of Final Grade**
Technology Explorations/Simulations	15%
Practice Assignments/Data Activities	15%
Discussion Participation	15%
Exit Tickets	15%
Lesson Plan project	15%
Capstone Project (Final)	25%

- **Essay and Project Assignments**

All assignments, presentation copies, reports, projects, etc., presented for submission must be presented in a professional manner using the format of the American Psychological Association (APA) Publication Manual, 7th Edition. More details about APA formatting can be found in the manual or the Purdue University OWL. I am happy to answer formatting questions and look over citations prior to submission if you come to me before the due date.

Weekly Technology Exploration/Simulation Assignments
Throughout the course, you will complete a series of assignments focused on simulations and the use of technology tools (e.g., CODAP, Google Sheets, Desmos, Excel). These assignments provide hands-on experience with probability experiments, sampling variability, and data analysis. Deliverables typically include screenshots of simulations, graphs, or data outputs, accompanied by written interpretations.

Weekly Practice Assignments/Data Activities
Throughout the course, you will complete short assignments that allow you to apply concepts from the readings and simulations to classroom contexts. These activities may include critiquing survey designs, drafting guiding questions for student discussions, or writing a short classroom activity based on a graph or dataset. Deliverables often combine written explanations (1–2 pages) with applied tasks that connect directly to the module's learning outcomes. Practice Assignments are intended to help you think about how to translate statistical concepts into classroom-ready activities.

Weekly Discussion Participation
Each module includes at least one discussion prompt where you will share ideas, respond to peers, and reflect on classroom applications of statistics and probability. Active participation in these asynchronous discussions is essential for building a collaborative learning community. You are expected to post an initial response and reply to at least two peers.

Weekly Exit Tickets
Each module concludes with a brief reflection activity, called an Exit Ticket. These assignments are designed to help you consolidate your learning, make connections to teaching practice, and identify lingering questions. Exit Tickets typically ask you to write 150–200 words responding to one or two focused prompts (e.g., "What was the most challenging concept in this module?" or "How might you support students in interpreting measures of spread?"). They provide both you and the instructor with insight into your progress throughout the course.

Lesson Plan Project
Due Date: 04/22
You will **develop and teach** a two-day statistics lesson plan appropriate for your mathematics or science students. The project will include:

- objectives for the lesson(s),
- the steps to enacting the lesson,
- student activity sheets to accompany the lesson,
- specific questions the teacher might ask during the lesson, and
- a developed assessment instrument that will indicate that learning took place.

This project is intended to be of practical value to you for use in your classroom now and in the future, so the lesson will be **enacted with your students** during this semester. You will also create a short presentation of your lesson plan project to explaining the content of

your lesson, the project description and your reaction to the assignment (approximately 5-8 minutes).

You will turn in an initial proposal for feedback and approval before writing the full lesson. *You will submit your lesson plan prior to teaching the lesson(s) with your students*.

- Your Lesson Plan Draft is due February 25th and Peer Feedback is due March 1st
- The Final Lesson Plan you are to teach is due March 11th or earlier. **You must submit your lesson plan prior to implementation.**
- Your Lesson Plan *implementation* must be completed by April 15th.
- The final Lesson Plan Reflection and Presentation are due April 22nd.

Capstone Project (Final)
Due Date: 05/06
The Capstone Project serves as the culminating assignment for this course. You will design a **technology-enhanced statistical investigation** that could be implemented in a secondary mathematics or science classroom (grades 6–12). The project should include:

- A clear statistical question aligned with the GAISE II framework.
- A plan for data collection (real or simulated) appropriate for secondary students.
- Technology-based methods for analyzing and representing the data (e.g., CODAP, Desmos, Google Sheets, Excel).
- Interpretation of results and connections to probability and/or inference concepts.
- A classroom-ready lesson plan or implementation guide, highlighting strategies for engaging all learners and promoting access to technology.

The final submission will include a written report (4–6 pages) and supporting materials (datasets, lesson plan, technology outputs). You will also complete a reflective essay (2–3 pages) articulating your philosophy of teaching statistics with technology and describing how this project demonstrates your growth throughout the course.

- **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 within one week of the posted deadline. You can access your scores at any time using "Grades" in Canvas.

- **Course Schedule**

Due Date	Modules/Topics	Assignments/Activities
1/14	Module 0 - Getting Started	• **M0: Syllabus Quiz (First Day Attendance Requirement)** • M0: Get-to-know-you Survey • M0: Introduce Yourself
Due Date	**Modules/Topics**	**Assignments/Activities**

1/28	Module 1 - Introduction to Data, Statistics, and Technology	• M1: Module overview • M1: Assigned Readings • M1: Technology Exploration/Simulation • M1: Practice Assignment/Data Activity • M1: Discussion • M1: Exit Ticket
2/11	Module 2 - Data Collection and Design of Investigations	• M2: Module overview • M2: Assigned Readings • M2: Technology Exploration/Simulation • M2: Practice Assignment/Data Activity • M2: Discussion • M2: Exit Ticket
2/25	Module 3 - Descriptive Statistics and Data Visualization	• M3: Module overview • M3: Assigned Readings • M3: Technology Exploration/Simulation • M3: Practice Assignment/Data Activity • M3: Discussion • M3: Exit Ticket • **M3: Lesson Plan Draft** • **M3: Lesson Plan Peer Feedback (due 03/01)**
03/11	Module 4 - Exploring Relationships in Data	• M4: Module overview • M4: Assigned Readings • M4: Technology Exploration/Simulation • M4: Practice Assignment/Data Activity • M4: Discussion • M4: Exit Ticket • **M4: Final Lesson Plan**
Due Date	**Modules/Topics**	**Assignments/Activities**
03/25	Module 5 – Probability Concepts and Simulations	• M5: Module overview • M5: Assigned Readings

		• M5: Technology Exploration/Simulation • M5: Practice Assignment/Data Activity • M5: Discussion • M5: Exit Ticket
04/08	Module 6 – Sampling Distributions and Inference	• M6: Module overview • M6: Assigned Readings • M6: Technology Exploration/Simulation • M6: Practice Assignment/Data Activity • M6: Discussion • M6: Exit Ticket
04/22	Module 7 – Teaching Statistical Thinking with Technology	• M7: Module overview • M7: Assigned Readings • M7: Technology Exploration/Simulation • M7: Practice Assignment/Data Activity • M7: Discussion • M7: Exit Ticket • **M7: Lesson Plan Project Reflection** • **M7: Lesson Plan Project Presentation**
05/06	Module 8 – Capstone Project	• **M8: Capstone Project**

* 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, and sexual harassment that **apply to all courses at USF**. These may be accessed on the USF Core Syllabus Policy Statements page.

- **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:

- 20% of all points of the assignment are lost if not submitted in class or emailed by the beginning of class but turned in no more than one class past the due date.
- An additional 10% will be lost each class thereafter.
- Assignments more than one week late will not be accepted without prior approval from the instructor.

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. Not all ideas can be supported by objective methods or criteria. Regardless, you may decide that certain ideas are worthy of your personal belief. In this course, however, you may be asked to engage with complex ideas and to demonstrate an understanding of the ideas. Understanding an idea does not mean that you are required to believe it or 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.

- **Course Policies: Student Expectations**

Title IX Policy
Title IX provides federal protections for discrimination based on sex, which includes discrimination based on pregnancy, sexual harassment, and interpersonal violence. In an effort to provide support and equal access, **USF has designated all faculty (TA, Adjunct, etc.) as Responsible Employees, who are required to report any disclosures of sexual harassment, sexual violence, relationship violence or stalking.** The Title IX Office makes every effort, when safe to do so, to reach out and provide resources and accommodations, and to discuss possible options for resolution. Anyone wishing to make a Title IX report or seeking accommodations may do so online, in person, via phone, or email to the Title IX Office. *If you are unsure what to do, please contact Victim Advocacy – a confidential resource that can review all your options – at 813-974-5756 or va@admin.usf.edu.*

Generative AI
Purpose: The purpose of this policy is to foster a dynamic learning environment that encourages technological adaptation,
innovative thinking, and the ethical use of AI resources in academic endeavors.
Policy:

1. **Definition of Generative AI Tools**: Generative AI tools refer to any artificial intelligence-powered software, program or application that can generate content, including but not limited to text, visuals, music, and other creative outputs. Examples of these tools include AI text generators, AI content rewriters, AI graphic generators, etc.
2. **Permitted Use**: The use of generative AI tools is permitted for course-related submissions, including assignments, projects, presentations, examinations, and other forms of assessment. However, students must responsibly use these tools, adhering to the guidelines outlined in this policy.
3. **Student Responsibility**: Students are responsible for appropriately using generative AI tools in their work. This includes:
    - Citing all AI-generated content used in their submissions.
    - Demonstrating a deep understanding of the subject matter, not solely relying on AI-generated content.
    - Cross-reference claims and statements with original sources and providing appropriate citations are expected.

- Using AI tools as a supplemental resource (i.e., as an editor), not as the primary means of completing assignments.
- Understanding that generative AI tools, while powerful, are not infallible and can produce misinformation or inaccurate results. Students are responsible for the accuracy of their submissions and must cross-verify the information produced by these tools with reliable sources.

1. **Violation Consequences**: Misuse of AI tools, including use of AI that undermines the student learning objectives of the course or assignment, failing to cite AI-generated content, relying too heavily on AI for work completion or submitting inaccurate information generated by AI tools, will be subject to academic penalties. Consequences may range from a reduction in an individual assignment grade to larger academic sanctions per USF policy, depending on the severity of the violation (USF Regulation 3.027).
2. **Exceptions**: If there are specific assignments where the use of AI tools is not appropriate, these will be clearly marked in the assignment guidelines. Students must adhere to these specific instructions.
3. **Questions and Clarifications**: If students are unsure whether a tool they wish to use qualifies as a generative AI tool, or if they have questions regarding the allowable use of such tools, they should consult with the course instructor before using it.

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 – any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

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.

Netiquette Guidelines

1. 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.
2. 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.
3. 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.

4. 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.
5. 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

1. Use the subject line effectively by using a meaningful line of what your email or discussion is about.
2. Keep your emails and postings related to the course content. You should not post anything personal on a discussion board, unless is requested by the instructor.
3. 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.

- **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 and Sarasota-Manatee campuses.
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.
IT website for the Tampa campus.
IT website for the St. Pete campus.
IT website for the Sarasota-Manatee campus.

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.
Counseling Center website for the St. Pete campus.
Counseling Center website for the Sarasota-Manatee 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.
Tutoring website for the St. Pete campus.
Tutoring website for the Sarasota-Manatee 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.
Writing studio website for the St. Pete campus.
Writing studio website for the Sarasota-Manatee campus.

- **Important Dates to Remember**

All dates and assignments are tentative and can be changed at the discretion of the professor. For important USF dates, see the Academic Calendar.