

## **MATH 514: Mathematical Modeling and Applications**

### **Western Kentucky University – Spring 2022**

**Instructor:** Nicholas Fortune  
**Email:** [nicholas.fotune@wku.edu](mailto:nicholas.fotune@wku.edu)  
**Office:** COHH 3111

**Classroom:** Online  
**Course Hours:** At your leisure with deadlines  
**Office Hours:** By appointment\*\*

\*\*I do not have set office hours for this class, but I am happy to meet with students via Zoom. Just send me an email and we can find a time to chat via Zoom.

**Course Description:** 3 Credit Hours – This course utilizes mathematical modeling to describe and explore real world problems using algebraic, geometric, and statistical approaches. This course is intended for secondary teachers. (Not applicable to the M.S. degree in Mathematics.)

**Learning Objectives:** Upon completion of this course students will be able to:

- Reason and communicate proficiently in mathematics with regards to using mathematics to model real-world phenomena,
- Understand mathematical concepts embedded in algebra, geometry, logic probability, and statistics through different representations and connections, and
- Use multiple content areas in mathematics to define, model, and solve problems.

**Prerequisites:** Admission to the Master of Arts in Mathematics program is required for enrollment into this course, or students may seek permission of the instructor.

**Textbook & Technology:** There is no required textbook for this course. Rather, we will use open source materials. Students will be provided all needed course materials via Blackboard. You are not required to have a graphing calculator, but if you have one, such as a TI-83 or TI-84, you can use it for some course assignments. We will use many free online graphing technologies (e.g., Desmos, GeoGebra, TUVa).

**Internet Access:** You must have regular access to the internet to access email and the course website – Blackboard. This will help ensure that you do not fall behind. Please check your email regularly and save class emails for future reference.

**Course Calendar:** A course calendar will be posted, once the course begins. Be sure to consult this for an approximate course calendar with important dates.

**Attendance Policy:** We will not have a set meeting time when everyone will be online; however, you are expected to be online frequently each week to check your WKU email and the discussion board – this is VITAL. In a face-to-face class, we would meet in person just shy of 3 hours each week. In addition to this, you are expected to put in additional time outside of class for reading, completing assignments, and studying – this is typically figured as 1 to 3 hours per credit hour per week. So, in a face-to-face class that can range from 6 to 12 hours a week for one class. I will expect you to do the same amount work as if this course was meeting in person. Make sure you do not get behind!

**WKU Syllabus Statement on COVID-19:** All students are strongly encouraged to [get the COVID-19 vaccine](#). Out of respect for the health and safety of the WKU community and in adherence with CDC guidelines and practices of all public universities and colleges in [Kentucky](#), the University requires that a cloth face covering (reusable or disposable) that covers both the nose and mouth must be worn at all times when in public areas within all buildings. Students must properly wear face coverings while in class regardless of the room size or the nature of the classroom activities. Students who fail to wear a face covering as required will be in violation of the WKU Student Code of Conduct and will be asked to comply or will face disciplinary action, including possible dismissal from the University. Accommodations can be requested in special cases through the Student Accessibility and Resource Center ([SARC](#)): [270-745-5004](#) (voice), [270-745-3030](#) (TTY), or [270-288-0597](#) (video).

All students must immediately report a positive Covid-19 test result or close contact with a person who has tested positive to the Covid-19 Assistance Line at 270-745-2019. The assistance line is available to answer questions regarding any Covid-19 related issue. This guidance is subject to change based on requirements set forth by public health agencies or the office of the governor. Please refer to the Healthy on the Hill website for the most current information. [www.wku.edu/healthyonthehill](http://www.wku.edu/healthyonthehill)

**Course Requirements:** Your grade in the course will be based on the following.

**Modeling Topic Assignments – 30%**

Assignments will be given on a weekly basis for the first six weeks (approximately) of the semester. Each topic's assignments will vary based on the content and learning objective of the week. Assignments will range from completing problems, writing about modeling, reading papers, technology problems, explorations, and more. As we are not using a traditional textbook, it is recommended that if you find you are unsure of a topic, that you take the initiative to get extra help from your classmates or me. Late assignments will be accepted if you get in touch with me before you miss the deadline. If not, 10% is deducted for each late day.

**First Group Modeling Project – 20%**

Details are in the course calendar and on Blackboard.

**Second Group Modeling Project – 20%**

Details are in the course calendar and on Blackboard.

**Final (Individual) Modeling Project – 30%**

There will be one individual modeling project, that will act as your final project. Details are in the course calendar and on Blackboard.

**Discussion Boards – Expected**

Discussion is a very important part of the learning process. While we cannot replicate in-class discussions in an online class, we can come close. Keeping in mind that this is an online course that utilizes an asynchronous environment, your participation is expected and required. That is, you will not be awarded (given points) for completing the

Discussion Boards (DBs). Instead, you will be graded punitively: if you fail to post, you will lose points from your overall grade.

For each topic's DB that is required, you will receive a check mark for completing the discussion on time and as expected (i.e., professional, respectful, a substantial post/response, and appropriate number of posts/responses). If you do not meet ALL of these expectations, you will not receive a check mark for the topic. I will review students' check marks and their final grade for the course will be lowered as followed (by percentage points):

- Missing 0 checks – final grade is not lowered
- Missing 1 check – lowered by 3% points
- Missing 2 checks – lowered by 6% points
- Missing 3 checks – lowered by 9% points
- Missing 4 checks – lowered by 12% points
- Missing 5 or more checks – lowered by 15% points

If you have any questions about what is expected, please email me ASAP (i.e., BEFORE the due date). I will have a column in Blackboard that indicates if you received a checkmark (shown as '1') or did not (shown as '0') for each topic's DBs.

**Determination of Final Course Grade:** The above assignments and assessments are weighted according to the noted percentages. Final course grades will be determined using the following scale:

Percentage	0% – 59%	60% – 69%	70% – 79%	80% – 89%	90% – 100%
Letter Grade	F	D	C	B	A

#### **Understanding Course Grades:**

- A** Pre-service or in-service teacher consistently demonstrates competencies that signal that they are proficient in the mathematical topics covered in the course. This qualification includes a deeper level of understanding than that expected of the students they are preparing to teach. Pre-service or in-service teacher demonstrates this level of understanding by consistently going beyond the information explicitly presented by the course instructor to completing new kinds of tasks. This ability to apply one's knowledge to new contexts and to put together various ideas is essential for effective classroom teaching because good teachers are able to respond to children's questions, to support and assess children's mathematical proficiency, and to interpret new curricula.
- B** Pre-service or in-service teacher occasionally demonstrates the competencies and the knowledge transfer abilities that characterize the mathematical proficiency of A-level students, but at times is limited to learning well just the information explicitly presented by the course instructor. Pre-service or in-service teacher shows evidence of better-than-acceptable level of mathematical proficiency in the topics studied and a deeper level of understanding than that expected of the students they are preparing to teach.

- C** Pre-service or in-service teacher consistently demonstrates good levels of performance on tasks measuring straightforward learning of course content, but rarely completes knowledge transfer tasks successfully. Shows evidence of an acceptable level of mathematical proficiency of the topics studied and shows evidence, although inconsistent, of a deeper level of understanding than that expected of the students they are preparing to teach.
- D** Pre-service or in-service teacher does not consistently show acceptable levels of performance, even on tasks measuring content explicitly presented by the course instructor. Although the pre-service or in-service teacher may have mastered some of the course content, and they show signs of considerable effort, serious questions persist about their mathematical proficiency and whether they have developed a deeper level of understanding than that expected of the students they are preparing to teach.
- F** Pre-service or in-service teacher shows a profile similar to that of the D student but, in addition, appears to be unprepared to teach others at this time. Pre-service or in-service teacher consistently exhibits lack of effort, profound and persistent misconceptions, and/or the failure to master some of the course topics.

**Academic Dishonesty:** Students who commit any act of academic dishonesty will receive from the instructor a failing grade in the course without possibility of withdrawal. The instructor will also present the case to the Office of Student Conduct for disciplinary sanctions.

**ADA Statement:** In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at [sarc.connect@wku.edu](mailto:sarc.connect@wku.edu). Please do not request accommodations directly from the professor or instructor without a faculty notification letter (FNL) from The Student Accessibility Resource Center.

**Title IX Misconduct/Assault:** Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) and Discrimination and Harassment Policy (#0.2040) at

<https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf>  
[https://wku.edu/policies/hr\\_policies/2040\\_discrimination\\_harassment\\_policy.pdf](https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf).

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

Please note that while you may report an incident of sex/gender-based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible

Employees” of the University and **MUST** report what you share to WKU’s Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU’s Counseling and Testing Center at 270-745-3159.

**Withdrawal Dates:** The last day to drop this course without a grade, without paying a fee, and to change from audit to credit is Tuesday, January 25, 2021. The last day to withdraw from this course with a W or change from credit to audit is Tuesday, April 5, 2021.

**The Learning Center:** The Learning Center (DSU 2141) provides free one-on-one tutoring and study areas available to all WKU students. For more information, or to schedule a tutoring appointment, please call TLC at (270) 745 - 6254 or visit their website at [www.wku.edu/tlc](http://www.wku.edu/tlc)

**Disclaimer:** The instructor reserves the right to change, alter, modify, or tweak anything in this document at any time for any reason.