



**Instructor:** Eric J. Wingler

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**Student Support Hours:** Monday: 1100—1200, 1300—1350  
Tuesday: 1100—1200  
Wednesday: 1100—1200, 1300—1350  
Thursday: (none)  
Friday: 1100—1200  
(or by appointment)

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**Course Description:** Introduction to the properties of the real number system and metrics and metric properties, with critical analysis of limits, continuity, differentiability, integration, and other fundamental concepts underlying the calculus.

**Prereq:** *MATH 3715* and one of *MATH 2673* or *MATH 2686H*.

**Course Materials:** *Elementary Real Analysis* (2nd Edition), Andrew M. Bruckner, Judith B. Bruckner, & Brian S. Thomson.

**Course Objectives:**

- Developing an understanding of the fundamental concepts of real analysis.
- Developing the ability to read and understand mathematical definitions, theorems, and proofs
- Demonstrating the ability to communicate in mathematics and produce well-written proofs

**Learning Outcomes and Tentative Course Schedule:**

- Describe fundamental properties of real numbers that lead to formal development of real analysis.
- Comprehend rigorous arguments developing the theory underpinning real analysis.
- Demonstrate an understanding of limits and how they are use in sequences, series, differentiation, and integration.
- Construct rigorous mathematical proofs of basic results in real analysis.

*The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.*

Section(s)	Topic(s)
1.1—1.10	Real numbers, suprema and infima, Archimedean property, density of rational numbers, triangle inequality
2.1—2.2, 2.4—2.13	Sequences of real numbers, convergence, Cauchy convergence criterion
4.1—4.6	Topological properties of sets of real numbers
5.1—5.2, 5.4—5.9	Continuous functions and limits, Extreme Value Theorem, the Darboux property
7.1—7.7, 7.9	Differentiation, Mean Value Theorem, the Darboux property of the derivative
If time permits: 8.1—8.5, 8.7	Riemann Integration, Fundamental Theorem of Calculus

**Grading Policy:**

- Your grade will be determined by your performance on exams, a final, quizzes, and homework.
- An important component of doing mathematics is expressing your ideas in a clear and correct manner. With practice, you will become adept at communicating in mathematics. Responsible collaboration with your peers is encouraged, as it will help you to assess whether you are expressing your mathematical ideas well. It is also important to work independently and turn in your own work.
- For further information, see “Other Course Policies” below.

**Other Course Policies:**

Your grade will be determined from class participation (5%), homework (25%), and exams (70%). While the final exam is not comprehensive, you still must be familiar with the concepts introduced

throughout the course to perform adequately. If you are auditing the course, you must attend at least 40% of the time to receive the grade AU; otherwise you will receive the grade W. Students taking Math 5851 will be expected to do more work than those taking Math 3751.

If you have a valid reason for missing an exam, you will be given a makeup. If possible, you should notify the instructor in advance of missing an exam to make arrangements to take a makeup.

On all exams it is expected that you will do your own work and not copy from others. Failure to comply with this policy may result in losing a significant amount of credit and could result in being assigned a failing grade for the course. On homework it is permissible to work in groups, but do not cheat yourself out of a learning experience by letting another person do all the work. Homework turned in late is subject to a slight reduction in credit (up to 20%) with the amount of reduction dependent on the degree of lateness. Generally, if your work on a homework assignment is substantially below perfect, you will be given a chance to redo the assignment for slightly less than full credit.

The following grading scale will be used.

88 – 100%	A
76 – 87%	B (at least)
64 – 75%	C (at least)
50 – 63%	D (at least)
Below 50%	F (at least)

#### **Semester Dates:**

*Monday, January 9, 2023 – Term Begins*

*Monday, January 16, 2023 – Martin Luther King Day (University Closed)*

*Tuesday, January 17, 2023 – The last day to add a class or change the grade option*

*Sunday, January 22, 2023 – The last day to drop with a full refund*

*Monday, January 23, 2023 – First day to drop with a grade of “W”*

*Monday, March 6 – Sunday, March 12, 2023 – Spring Break*

*Wednesday, March 22, 2023 – The last day to drop the course with a grade of “W”*

*Monday, May 1 – Saturday, May 6, 2023 – Final Exams*

*Saturday, May 6, 2023 – Term Ends*

Please refer to [this site](#) in the event of changes to semester dates.

**Mathematics Achievement Center (MAC):** The [Math Achievement Center](#) is an academic support service which is integrated with the Department of Mathematics & Statistics. Our mission is to assist YSU students in the strengthening of the fundamental mathematics skills which are necessary for success in the study of mathematics and to provide resource materials for independent study.

**Location:** Cafaro Hall Room 408 and Online

**Email:** [mac@ysu.edu](mailto:mac@ysu.edu)

**Phone:** (330)-941-3274

Visit our [website](#) to schedule an appointment and check for services available for your course.

**Honors Contracts:** Honors students may contract this course for honors credit. Notify your instructor of your interest to discuss options, complete required paperwork, and submit the required materials to the instructor by the semester deadline.

**Blackboard:** This class will be using the Learning Management System Blackboard. Blackboard can be accessed at: <https://ysu.blackboard.com/>. Here you will find a copy of this syllabus, assignments, notes, solutions, etc. You are required to regularly check Blackboard for documents.

**Faculty Evaluations:** At the end of the semester, you will be asked to evaluate the instructor and the course in general. We ask that you take these evaluations seriously and provide honest feedback as these are reviewed by the Chair of the Department of Mathematics and Statistics.

**YSU Policies:** [University policies](#) can be found online and provide you guidance on your rights as a student in this course. The links below take you directly to a specific policy. Should you have any questions about a policy, please do not hesitate to contact me using the information at the top of the syllabus.

- [Statement of Non-Discrimination from the University](#)
- [Academic Integrity/Honesty](#)
- [Student Accessibility](#)
  - In accordance with university procedures, if you have a documented disability and require accommodations to obtain equal access in this course; please contact me privately to discuss your specific needs. To coordinate reasonable accommodations, you must be registered with the Accessibility Services, located in Kilcawley Center Room 2082. You can reach Accessibility Services at 330-941-1372.
- [Incomplete Grade Policy](#)
- [Coronavirus Statement](#)

**How to Get Help:** YSU is committed to your success. As a student you have access to several resources that may be instrumental in helping you succeed in this course and others. Please do not hesitate to utilize any of these [free support services](#) to support your academic success, physical and mental health, and help you navigate your time as a YSU student.

**Additional Resources:**

- [The Penguin Service Center](#) - The Penguin Service Center is a single place to receive essential information, find guidance, and resolve enrollment-related concerns in the areas of financial aid, records and registration, and student billing. Call the Penguin Service Center at 330-941-6000 or visit their website to [Ask a Question](#).
- [University Counseling Services](#) - As a student, you may experience a variety of concerns that can impede your academic success. Such life stressors may lead to diminished academic performance or reduce your ability to participate fully in life. Services are available to assist you with addressing these and other concerns you may be experiencing. Contact the Student Counseling Services (330-941-3737) to learn more about the confidential mental health services available to our currently enrolled students.
- [College/University Career Advisement](#) - The academic advising staff at Youngstown State University assists undergraduate students in the development of meaningful educational plans while maintaining the integrity of the institutional programs and degrees. For any academic advising questions please [visit here](#) to be directed to your academic college.