



*Department of Mathematics and Statistics*  
*Course Outline for MATH 3751/5851*

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**Course Title:** Real Analysis 1

**Course Number and CRN:** MATH 3751/5851

**Semester:** Spring 2021

**Course Credit:** 4 s.h.

**Text:** Thomson, Bruckner, *Elementary Real Analysis* (2nd Edition), 2008, Prentice Hall

**Course Prerequisite:** MATH 3715 and one of MATH 2673 or MATH 2686H

**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.

**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:**

- 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.

**Blackboard:** This class will be using the Learning Management System Blackboard. Blackboard can be accessed: <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 evaluation 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.

**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.

## **YSU Policies:**

Coronavirus Policy: As a consequence of the current coronavirus pandemic, students are expected to abide by all safety and health policies implemented by the University's Office of Environmental Occupational Health and Safety as well as all applicable local, state, and federal mandates. Currently, the City of Youngstown and the State of Ohio mandates a face covering/mask in public spaces. Consistent with federal, state and local guidelines, University Health Guidelines require that all individuals within campus buildings, including students, properly wear face coverings except when working alone within an enclosed area. Face coverings are in addition to maintaining appropriate social distancing when possible. Exceptions to wearing a face covering in a classroom or laboratory must be for justifiable reasons as approved by the Office of Disability Services (<https://ysu.edu/center-for-student-progress/disability-services>). Repeated violations of any coronavirus safety and health policy shall be handled in accord with The Student Code of Conduct (<https://ysu.edu/student-conduct/code-conduct>).

Students with Disabilities: 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 Center for Student Progress Disability Services, located in Kilcawley Center Room 2082. You can reach CSP Disability Services at 330-941-1372.

Non-Discrimination from the University: Youngstown State University does not discriminate on the basis of race, color, national origin, sex, sexual orientation, gender identity and/or expression, disability, age, religion or veteran/military status in its programs or activities. Please visit [www.ysu.edu/ada-accessibility](http://www.ysu.edu/ada-accessibility) for contact information for persons designated to handle questions about this policy.

Academic Integrity: As outlined in The Student Code of Conduct, all forms of academic dishonesty are prohibited at Youngstown State. This includes plagiarism, the unauthorized use of tools or notes in taking tests or completing assignments, fabrication of data or information used for an assignment, working with others without permission from the instructor, and more. A student who is believed to have violated the academic integrity policy will meet with the instructor to discuss the allegations. The student may accept responsibility for the violation and any sanctions selected by the instructor, or they have the right to ask for a hearing before a hearing panel. The full Academic Integrity policy can be found in Article III. 1. of The Student Code of Conduct, while further information on University procedures for alleged academic integrity violations can be found in Article V.

Cancelled Class Policy: If this class is being cancelled for any one day because of instructor illness, or other reasons, a notice will be sent to your YSU email address as soon as possible. University-wide class cancellation is a decision made by the President's Office, and officially announced via the YSU homepage and on WYSU (88.5 FM) radio. Students may also register at the YSU Portal to receive a text message about University-wide closures via the Emergency Alert Notification System. Please familiarize yourself with the University's Cancellation and Closing Procedures: <https://ysu.edu/cancellation-and-closing-procedures>.

### **Important Semester Dates:**

- *Monday, January 11, 2021* – Term Begins
- *Monday, January 18, 2021* – Martin Luther King Day (University closed)
- *Tuesday, January 19, 2021* – The last day to add a class or change the grade option
- *Sunday, January 24, 2021* – The last day to withdraw with a full refund
- *Tuesday, February 16, 2021* – *Wellness Day, No Classes*
- *Thursday, March 11- Friday, March 12, 2021* – *Wellness Days, No Classes*
- *Sunday, March 21, 2021* – The last day to drop the course with a grade of “W”
- *Wednesday, April 7, 2021* – *Wellness Day, No Classes*
- *Friday, April 23, 2021* – *Wellness Day, No Classes*
- *Monday, May 3 – Saturday, May 8, 2021* – Final Exams
- *Saturday, May 8, 2021* – Term Ends

### **Mathematics Assistance Center (MAC):**

For all your mathematics needs:

- Tutoring
- Computers
- Limited Course Materials

Location: Lincoln Building Room 408 and Online

MAC Webpage: (<https://cms.ysu.edu/mathematics-assistance-center/math-assistance-center>)

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

Phone: 330-941-3274

Visit our website to schedule an appointment.

*Check for services available for your course.*

### **Additional Information:**

[The Penguin Service Center](#) - A One Stop for Campus is an enrollment resource established to help students access and manage their academic record and student accounts. Please visit the Penguin Service Center or call (330) 941-6000 for assistance with financial aid, records access, registration processes, and tuition charges/billing. The office is located on the second floor of Meshel Hall.

[College/University Career Advisement](#)

[University Counseling Services](#)

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*The following information is provided by your instructor:*

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**Faculty Information:**

Instructor:	Eric J Wingler
Office Location:	536 Lincoln Building
Email:	ejwingler@ysu.edu
Phone:	330-941-1817
Office Hours: (online and in office)	Monday: 1315 – 1430 Tuesday: 1315 – 1430 Wednesday: 1315 – 1430 Thursday: (none scheduled) Friday: 1315 – 1430 (Or by appointment)
Section Information	CRN: 21505/21609 Modality: Traditional Days/Times: MTWF, 1000 – 1050 Location: 303 Lincoln Building

**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.

**Course Topics:**

Section(s)	Tentative Week(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 derivativ
If time permits: 8.1-8.5, 8.7		Riemann Integration, Fundamental Theorem of Calculus

**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)