

**MATH 4650**

**Introduction to Real Analysis I**

**Fall 2020**

<b>Instructor</b>	Dr. Kit C. Chan E-mail: kchan@bgsu.edu
<b>Class Time</b>	MWF 8:30 - 9:20 am (All virtual classes via Webex)
<b>Office Hours</b>	Virtual Office Hours: MWF 9:30 - 10:20 am, and by appointment
<b>Text</b>	Elementary Analysis: The Theory of Calculus Kenneth A. Ross
<b>Topics</b>	Chapter 1. Real Numbers Chapter 2. Sequences and Series Chapter 3. Continuity, Limits, Topology Chapter 4. Sequences and Series of Functions Chapter 5. Differentiation Chapter 6. Integration
<b>Course Description</b>	The course is designed to introduce students to a rigorous treatment of calculus, and provide a foundation for any analysis courses in pure mathematics, applied mathematics, statistics, as well as mathematics education for high school curricula. The course uses the formal definition of limit and its properties to study both differential and integral calculus, as well as functions on a real domain.
<b>Course Objectives</b>	<ol style="list-style-type: none"><li>1. To learn definitions and theorems in real analysis.</li><li>2. To learn how to write mathematical statements in real analysis.</li><li>3. To learn how to present simple proofs in a logical manner.</li><li>4. To learn how to provide counterexamples to a mathematical statement.</li></ol>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students are able to provide intuition for real analysis.</li><li>2. Students are able to learn more analysis in subsequent courses.</li><li>3. Students are able to develop their logical ideas.</li><li>4. Students are able to present logical proofs.</li></ol>

<b>Course Delivery</b>	The course employs the remote learning mode. Students are expected to virtually attend each class at the designated class time. The classes are videotaped so that the students can always play back the class meetings. Communications between instructors and students will be through announcements and e-mails.
<b>Instructional Strategies</b>	In each virtual class, definitions and theorems are explained. In addition, many examples are given to illustrate the theory, and build intuition. Students also learn how to do homework problems. Homework problems are assigned after each class. Students can collaborate with other students to do their homework. They are welcome to Dr. Chan's virtual office hours to ask questions. Khan Academy has online videos in real analysis that provide an excellent alternative resource to supplement the course materials. Students have to take quizzes, tests and the final exam at the designated times. They have to work on the quizzes, tests and the final exam by themselves without communicating with any person, or seeking any online help.
<b>Required Resources</b>	<ol style="list-style-type: none"> <li>1. Access to internet connection.</li> <li>2. The only required text is listed in the above. Any edition of the text is fine. All editions have the same homework problems.</li> <li>3. A BGSU e-mail account.</li> <li>4. Khan Academy is not required but a good optional resource.</li> </ol>
<b>Computer Skills</b>	<ol style="list-style-type: none"> <li>1. BGSU video meeting software (Webex).</li> <li>2. BGSU e-mail account.</li> </ol>
<b>Prerequisites</b>	<ol style="list-style-type: none"> <li>3. Scanning tests and uploading to Canvas.</li> </ol>
<b>System Requirements</b>	<ol style="list-style-type: none"> <li>1. Computer specifications in Canvas guide:  <a href="https://community.canvaslms.com/docs/DOC-10721">https://community.canvaslms.com/docs/DOC-10721</a></li> <li>2. Browser requirements in Canvas guide  <a href="https://community.canvaslms.com/docs/DOC-10720">https://community.canvaslms.com/docs/DOC-10720</a></li> </ol>
<b>Attendance Participation Interaction</b>	Students are required to virtually attend every class, and participate in class discussions. When students have any question in class, they should feel free to ask in class, so that

Dr. Chan can discuss with the whole class. For questions about homework, they are welcome to ask Dr. Chan at the beginning of each class, or during Dr. Chan's office hours. They can also make an appointment with Dr. Chan for any question that they have, or send Dr. Chan the question by e-mail.

**Learning  
Outcomes  
Assessment**

1. Weekly Quizzes. A quiz is given every Friday during the semester, starting September 4. The quiz is given at the end of the class period. Each quiz carries 10 points and consists of one or two problems similar to the homework problems that have been assigned a few days before. The lowest two quiz scores in the semester will be dropped.
2. Two Tests. Each test carries 100 points and consists of problems that are similar to the homework problems. The syllabus for each test will be announced a week before the test.
3. The Final Exam. The final exam carries 100 points and consists of problems that are similar to the homework problems. The final exam will be comprehensive.

**Grading  
Rubrics**

Every quiz, test and the final exam will be graded based on mathematical accuracy, logical presentation of arguments, mathematical statements, and citation of definitions and theorems.

**Submission**

Every quiz, test and the final exam is to be submitted through Canvas. If that is not possible, the student can send it to Dr. Chan by e-mail at [kchan@bgsu.edu](mailto:kchan@bgsu.edu).

**Grade  
Breakdown**

Quizzes (Every Friday starting September 4)	30%
Test 1 (October 5, class time, Monday)	20%
Test 2 (November 23, class time, Monday)	20%
Final Exam (Time: Follow University Schedule)	30%

<b>Grading Scale</b>	90	-	100%	A
	80	-	89%	B
	70	-	79%	C
	60	-	69%	D
	0	-	59%	F

**Make-up Policy** If a student misses a quiz, a test, or the final exam, then the student will receive zero point for that score. However, if a student has a legitimate reason with a written excuse, then a special consideration will be given.

**Communication**

1. The best way to communicate with Dr. Chan is by e-mail at kchan@bgsu.edu. Under normal circumstances, Dr. Chan will respond within a few hours.
2. During the time of the pandemic, Dr. Chan cannot be in his office on campus on a regular basis. So the university phone is not a good way to communicate.

**Learning Support**

1. Math Problems. If a student has a question about the course materials, the student should feel free to ask in class or during office hours, or e-mail to Dr. Chan at kchan@bgsu.edu.
2. Supplemental Materials. Khan Academy has some good videos about the course materials. They are not required, but good resources for the students to supplement the course materials.
3. Technology. When a student has a question about Canvas, BGSU e-mail account, and other computer related issues, please contact BGSU's Information Technology Services (ITS) at 419-372-0999.

**Policy Statements**

1. Class Policy. While students can collaborate on homework problems, they must do all quizzes, tests, and the final exam by themselves, without help from any person or from the internet.
2. Student Code of Conduct. Any enrolled student at BGSU has agreed to abide by the Student Code of Conduct as outlined in the Student Handbook. Any student is expected to be familiar with the code. If a student has any question, please do not

hesitate to contact the Office of the Dean of Students at 419-372-2843. The Student Handbook is available at <https://www.bgsu.edu/student-handbook.html>.

- Accessibility** Any student with documented disability might require modification. Please contact Dr. Chan at least one week prior to the test date. Students wishing to discuss their eligibility for such accommodations are encouraged to call BGSU's Accessibility Services at 419-372-8495, or e-mail them at [access@bgsu.edu](mailto:access@bgsu.edu), or check their website at : <https://www.bgsu.edu/accessibility-services.html>.
- Religious Holidays** It is the policy of the University to make every reasonable effort allowing students to observe their religious holidays without academic penalty. In such cases, it is the obligation of the student to provide the instructor with reasonable notice of the dates of the religious holidays on which the student will be absent. Absence from classes or exams for religious reasons does not relieve the student of responsibility for completing required work missed.
- Student Veteran-Friendly Campus** BGSU educators recognize student veteran's rights when entering and exiting the university system. Any student veteran should communicate with Dr. Chan so that reasonable accommodations can be made for absence when drilling or being called to active duty. For the details, please refer to the following website: [www.bgsu.edu/nontraditional-and-military-students/veterans.html](http://www.bgsu.edu/nontraditional-and-military-students/veterans.html).
- University Closure** In most cases, BGSU will not close for winter conditions unless the Wood County Sheriff's Department declares a Level 3 emergency. Once the decision is made to delay, cancel or close, individuals will be notified through AlertBG, e-mail, the BGSU homepage BGSU social media channels and the news media.