# Undergraduate Course Syllabus

## MAT 370: Real Analysis
Center: Online

### Course Prerequisites
MAT 210 and MAT 299

### Course Description
This course provides a theoretical foundation for single-variable calculus concepts. Topics include the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration. Proof and problem solving in real analysis will be emphasized.

### Course Outcomes
- Investigate properties in real analysis through problems concerning the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration
- Write and orally defend mathematical proofs in real analysis concerning the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration. Note that "orally defending" means not just presenting a proof but also defending it to individuals who may ask questions during the presentation

### Required Materials
*The Real Numbers and Real Analysis*
Ethan Bloch
Springer
2010
9780387721767

### Instructor Availability and Response Time
Your class interaction with your instructor and your classmates will take place in Blackboard on a regular, ongoing basis. Your instructor will be active in Blackboard at least five days a week, and you will normally communicate with your instructor in the open Blackboard discussion forum so that your questions and the instructor's answers benefit the entire class. You should send emails directly to your instructor only when you need to discuss something of a personal or sensitive nature, and in those cases your instructor will generally provide a response within 24 hours.

**Grade Distribution**

| Assignment Category | Number of Graded Items | Point Value per Item | Total Points |
|---|---|---|---|
| Group Discussions | 8 | 40 | 320 |
| Quizzes | 6 | 50 | 300 |
| Final Project | | | |
| Milestone One | 1 | 40 | 40 |
| Milestone Two | 1 | 100 | 100 |
| Milestone Three | 1 | 200 | 200 |
| Milestone Four | 1 | 40 | 40 |
| | | **Total Course Points:** | 1,000 |

This course may also contain practice activities. The purpose of these non-graded activities is to assist you in mastering the learning outcomes in the graded activity items listed above.

**University Grading System: Undergraduate**

| Grade | Numerical Equivalent | Points | Points Equivalent Lower | Upper |
|---|---|---|---|---|
| | | Total Points: 1,000 | | |
| A | 93-100 | 4 | 930 | 1,000 |
| A- | 90-92 | 3.67 | 900 | 929 |
| B+ | 87-89 | 3.33 | 870 | 899 |
| B | 83-86 | 3 | 830 | 869 |
| B- | 80-82 | 2.67 | 800 | 829 |
| C+ | 77-79 | 2.33 | 770 | 799 |
| C | 73-76 | 2 | 730 | 769 |
| C- | 70-72 | 1.67 | 700 | 729 |
| D+ | 67-69 | 1.33 | 670 | 699 |
| D | 60-66 | 1 | 600 | 669 |
| F | 0-59 | 0 | 0 | 599 |
| I | Incomplete | | | |
| IF | Incomplete/Failure* | | | |
| IP | In Progress (past end of term) | | | |
| W | Withdrawn | | | |

**\***Incomplete and Incomplete/Failure**:** Any student requesting an "I" grade must complete a Student Petition & Contract for a Grade of Incomplete and submit it to the proper offices prior to the final day of the term/semester. The petition will specify a deadline by which the coursework must be completed. The incomplete automatically becomes an "IF" if work has not been completed and a grade has not been submitted by the specific deadline.

**Grading Guides**

Specific activity directions and grading guides can be found in the Course Information area in the Assignment Guidelines and Rubrics folder.

**Weekly Assignment Schedule**

The Learning Modules area in Blackboard contains one module folder for each week of the course. All reading and assignment information can be found in the folders. All assignments are due by 11:59 p.m. EST on the last day of the module week unless specified otherwise.

In addition to the textbook readings that are listed, there may be additional required resources within each module in Blackboard.

| Module | Topics and Assignments |
|:---:|:---|
| 1 | Icebreaker Activity (Required) |
| | Constructing the Real Numbers |
| | *The Real Numbers and Real Analysis,* Chapter 1 |
| | 1-1 Group Discussion: Constructing the Real Numbers |
| | 1-2 Final Project Review |
| | 1-3 Oral Defense Sign Up and Modeling Sessions |
| | 1-4 Quiz: Module One |
| 2 | Properties of the Real Numbers, Part 1 |
| | *The Real Numbers and Real Analysis,* Chapter 2 |
| | 2-1 Group Discussion: Properties of the Real Numbers |
| | 2-2 Final Project Milestone One: Topic Selection |
| | 2-3 Quiz: Module Two |
| 3 | Properties of the Real Numbers, Part 2 |
| | *The Real Numbers and Real Analysis,* Chapter 2 |
| | 3-1 Group Discussion: Properties of the Real Numbers, Part 2 |
| | 3-2 Quiz: Module Three |
| 4 | Limits of Functions |
| | *The Real Numbers and Real Analysis,* Chapter 3 |
| | 4-1 Group Discussion: Limits of Functions |
| | 4-2 Final Project Milestone Two: Rough Draft of Mathematical Proof and Practice Oral Defense |
| | 4-3 Quiz: Module Four |
| 5 | Continuity and Uniform Continuity |
| | *The Real Numbers and Real Analysis,* Chapter 3 |
| | 5-1 Group Discussion: Continuity and Uniform Continuity |
| | 5-2 Quiz: Module Five |

| 6 | The Derivative |
|---|---|
| | *The Real Numbers and Real Analysis,* Chapter 4 |
| | 6-1 Group Discussion: The Derivative |
| | 6-2 Quiz: Module Six |
| 7 | Applications of the Derivative |
| | *The Real Numbers and Real Analysis,* Chapter 4: Sections 4.4–4.6 |
| | 7-1 Group Discussion: Applications of the Derivative |
| | 7-2 Final Project Milestone Three: Live Oral Defense: Final Mathematical Proof |
| 8 | The Riemann Integral |
| | *The Real Numbers and Real Analysis,* Chapter 5 |
| | 8-1 Group Discussion: The Riemann Integral |
| | 8-2 Final Project Milestone Four: Oral Defense Reflection |

**Attendance Policy**

Failure to participate during the first week of the course (12:00 a.m. Monday through 11:59 p.m. Sunday) will result in automatic withdrawal. Participation is defined as posting within a discussion board, wiki, or blog, and/or submitting an assignment. Students who do not participate during the first week forfeit their rights to be reinstated into the course.

Extended absences, defined as failure to post into the Blackboard classroom for more than five days, must be coordinated with the instructor. Students who fail to coordinate any such absence with the instructor, or who fail to withdraw from the course in accordance with the COCE official drop and withdrawal policy, will be graded appropriately.

All assignments must be submitted through the appropriate Blackboard tool by 11:59 PM Eastern Standard Time on the specified due date. Refer to the Assignment Guidelines and Rubrics folder for specific details on completing the assignments in this course.

**SNHU College of Online and Continuing Education Withdrawal Policy**
https://my.snhu.edu/_layouts/FormServer.aspx?XsnLocation=https://my.snhu.edu/FormServerTemplates/COCE.Withdrawal.revised.form.xsn&SaveLocation=https%3A%2F%2Fmy%2Esnhu%2Eedu%2FOffices%2FCOCE%2FAdvising%2FCourse%20Withdrawal%20Library&OpenIn=browser

**SNHU College of Online and Continuing Education Guide to Student Success**
https://my.snhu.edu/Resources/StudentHandbooks/Pages/default.aspx

**Blackboard Course Tools/Areas Overview**
Your course will be delivered through Blackboard. Below are the most often used Blackboard tools and areas.

| Tool/Area | Description | You Should… |
|---|---|---|
| Announcements | This area is used to post day-to-day course details such as the status of or directions for assignments. | Check the announcements on a regular basis, at least several times each week. |
| Course Information | The course syllabus, assignment guidelines and rubrics, technical support, Student Handbook, and advising information can be found here. | Check this area at the start of the class. It is recommended that the syllabus be downloaded for future reference. |
| Learning Modules | This area contains course content, including lectures, readings, resources, and assignments. | Check this area at the start of each module and throughout the module week to review course materials. |
| Discussion Board | This is one of the areas for discussion and collaboration in the class. | Participate and contribute on a regular basis if your course includes discussions. |
| Research/Writing | SNHU library and research information can be found here. | Check this area for links and information on different library-related resources. |
| My Instructor | Instructor information is located in this area. | Check this area to find out about your instructor's background and contact information. |
| My Grades | Assignment grades are located in this area. | Check this area to find out your grades for your course assignments. |

**Southern New Hampshire University Policies**

More information about SNHU policies can be found at
https://my.snhu.edu/Academics/Pages/SyllabiStatements.aspx.

**Continuing Education Center Instructor Availability:** All undergraduate Continuing Education instructors at all center locations (Manchester, Nashua, Salem, Portsmouth, and Brunswick, Maine) will be available to students for a minimum of four additional hours of face-to-face meeting time per term. This time is in addition to the required 20 hours of face-to-face time in hybrid classes and the required 40 hours of face-to-face time in lecture classes. How the additional meeting time is utilized is at the discretion of the instructor and may vary by course.

**Academic Honesty Policy:** Southern New Hampshire University requires all students to adhere to high standards of integrity in their academic work. Activities such as plagiarism and cheating are not condoned by the university. Students involved in such activities are subject to serious disciplinary action. Plagiarism is defined as the use, whether by paraphrase or direct quotation, of the published or unpublished work of another without full and clear acknowledgment. Cheating includes the giving or receiving of unauthorized assistance on quizzes, examinations, or written assignments from any source not approved by the instructor. Understand that in taking this course, your assignments may be submitted to Turnitin.com or other plagiarism-detection services and

reviewed for textual similarity suggestive of plagiarism. All submitted papers are subsequently included as source material in the Turnitin.com database for the purpose of detecting plagiarism in other submitted work. Please review the Turnitin.com Usage Policy should you have any questions. For more about academic dishonesty, please refer to the undergraduate or graduate catalogs.

**ADA/504 Compliance Statement:** Southern New Hampshire University is committed to and concerned with meeting the needs of students challenged by physical, sensory, psychiatric and/or learning disabilities with regard to the Americans with Disabilities Act (ADA), as amended, and Section 504 of the 1973 Rehabilitation Act. At the beginning of each term, or as soon as you become aware of a disability, we encourage you to contact the Office of Disability Services to discuss accommodations for which you may be qualified.

For questions concerning support services, documentation guidelines, or general disability issues:

Office of Disability Services, Exeter Hall, Suite 59

Hyla Jaffe, Director

603.626.9100 ext. 2386

h.jaffe@snhu.edu

For questions concerning disability-related compliance matters, grievance, or legal issues:

Ms. Jet Goldberg, ADA/504 Compliance Officer

Director of Wellness Center

603-645-9679

j.goldberg@snhu.edu

**Technical Support:** Support for Blackboard or other technology issues via phone, chat, and online form submission is available from the SNHU Technology Help Desk at http://www.snhu.edu/techsupport including 1.855.877.9919. Technical support is available 24/7.

**Academic Assistance:** Online students enrolled in undergraduate courses in the areas of math, writing, accounting, and statistics will have access to Smarthinking online tutoring:
https://my.snhu.edu/offices/COCE/Tutoring/Pages/default.aspx.

**Library Resources Statement:** In addition to the intellectual resources available onsite and online, https://my.snhu.edu/Academics/Library/Pages/default.aspx, Shapiro Library makes available group and one-on-one instruction in information literacy, enabling students to define and articulate what knowledge-based resources are relevant to their research interests. Library staff are available to assist students in effectively and efficiently accessing information from credible sources, to compare new knowledge with prior beliefs, and to consider the related ethical, legal, and socioeconomic issues that are inherent in scholarly investigation.

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