

Math 341 Foundations of Analysis

Syllabus Spring 2018

Professor David Catlin

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MA341 is an introductory course in rigorous analysis. It covers real numbers, sequences, series, continuous functions, differentiation, and integration.

Text: An Introduction to Real Analysis (4th Edition) by Bartle and Sherbert

Class schedule: MWF 1:30-2:20 in UNIV 103

Office hours: Wed 2:30-3:30, Tues & Thurs 11:30-12:30, or by appointment.

Course website: <https://math.purdue.edu/~catlin/MA341-spring2018>

All homework assignments and exam information will be available online. Lectures will be available online on the day of the lecture.

Exams: There will be 2 midterm exams and a comprehensive final. Study guides, review problems, and tests from previous semesters will be available at the course website. The grading scale for each exam will be given on the day the exam is returned. If you have any questions about the grading of exam problems, you can make an appointment to discuss.

Homework: Homework problems and due dates will be posted at the course website. Homework will generally be collected on Fridays and returned on the following Wednesday. Late homework will have **30%** of the score deducted. Homework that is not handed in by the next class will not be accepted. If you are not in class on Wednesday to pick up the graded homework, you will need to come to MATH 744 during office hours to pick it up. Your total homework score will be **12%** of your final grade. If you have any questions about the grading of your homework, you can make an appointment to discuss.

Quizzes: A quiz will be given each Monday except for the first class and during exam weeks. Quizzes cannot be made up. Your total quiz score will be **8%** of your final grade.

Class policies: You should attend every class. Make an appointment to discuss any special requests such as: you cannot take an exam on the scheduled day, you need special accommodations to take exams, there are special circumstances for late homework or a missed quiz, etc. The grading policy is as follows:

- . Homeworks 12%
- . Quizzes 8%
- . Midterm Exam I and II 25% for each
- . Final Exam 30%

You are expected to observe academic honesty to the highest standard. Any form of cheating automatically leads to an F grade, plus other disciplinary action deemed appropriate.

Accommodations for Students with Disabilities: In this mathematics course, accommodations are managed between the instructor, student, and DRC Testing Center. Students should see this instructor outside class hours as soon as possible – before or after class or during office hours – to discuss necessary accommodations.

The topic for each lecture is listed below and includes the section where the material is covered in the textbook. Sections refer to the course textbook unless otherwise noted. Some lectures will cover material from other textbooks.

- Lecture 1 : **Sets and Functions** Section 1.1
- Lecture 2 : **Mathematical Induction** Section 1.2
- Lecture 3 : **Finite and Infinite Sets** Section 1.3
- Lecture 4 : **Properties of the Real Numbers** Section 2.1
- Lecture 5 : **Absolute Value** Section 2.2
- Lecture 6 : **Completeness Property** Section 2.3
- Lecture 7 : **Applications of the Supremum Property** Section 2.4
- Lecture 8 : **Intervals** Section 2.5
- Lecture 9 : **Sequences** Section 3.1
- Lecture 10 : **Limit Theorems** Section 3.2
- Lecture 11: **Monotone Sequences** Section 3.3
- Lecture 12: **Bolzano-Weierstrass Theorem** Section 3.4
- Lecture 13: **Cauchy Criterion** Section 3.5
- Lecture 14: **Properly Divergent Sequences** Section 3.6
- Lecture 15: **Infinite Series** Section 3.7
- Lecture 16: **Limits of Functions** Section 4.1
- Exam 1: Covers Lecture 1 through Lecture 16
- Lecture 17: **Limit Theorems** Section 4.2
- Lecture 18: **Extensions of Limits** Section 4.3
- Lecture 19: **Continuous Functions** Section 5.1
- Lecture 20: **Combinations of Continuous Functions** Section 5.2
- Lecture 21: **Combinations of Continuous Functions Part II**
Continuous Functions on Intervals Sections 5.2 and 5.3
- Lecture 22: **Continuous Functions on Intervals Part II** Section 5.3
- Lecture 23: **Uniform Continuity** Section 5.4
- Lecture 24: **Monotone and Inverse Functions** Section 5.6
- Lecture 25: **The Derivative** Section 6.1
- Lecture 26: **Mean Value Theorem** Section 6.2

Lecture 27: **Mean Value Theorem Part II**
L'Hospital's Rule Sections 6.2 and 6.3
Lecture 28: **L'Hospital's Rule Part II** Section 6.3
Lecture 29: **Taylor's Theorem** Section 6.4
Lecture 30: **Taylor's Theorem Part II** Section 6.4
Lecture 31: **The Darboux Integral** Section 7.4
Lecture 32: **Darboux Integrable Functions** Section 7.2 adapted
Lecture 33: **The Fundamental Theorem** Section 7.3
Lecture 34: **Pointwise and Uniform Convergence** Section 8.1
Exam 2: Covers Lecture 17 through Lecture 34
Lecture 35: **Interchange of Limits** Section 8.2
Lecture 36: **Exponential and Logarithmic Functions** Section 8.3
Lecture 37: **The Trigonometric Functions** Section 8.4
Lecture 38: **The Trigonometric Functions Part II** Section 8.4
Lecture 39: **Limits in Two Variables** (adapted from external sources)
Lecture 40: **Fundamental Theorem of Algebra** (adapted from external sources)
Final Exam: Comprehensive