Metropolitan State University
College of Sciences
MATH 301-01 Introduction to Analysis

Term:	Fall 2016
Meeting:	Tuesdays 6—9:20am
Instructor:	Dr. Pangyen Ben Weng, Associate Professor of Mathematics
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Course Description: This is an introductory course in real analysis, and a gateway into advanced mathematics for undergraduate students who have completed single variable Calculus. In this class students must strive to learn and eventually to master the essential elements of advanced mathematics: abstraction of mathematical concepts, rigor in the mathematical language, and derivation of theoretical proofs. Topics of this course include logic and the construction of proofs, mathematical induction, the real number system and its topology, sequences and series of real numbers, limits and continuity of functions, derivatives, sequences and series of functions and possibly the Riemann Integral.

Calculators: Calculators are not needed for this class, and are not allowed in exams.

Textbook: (Required). *Understanding Analysis,* 2nd Edition, by Stephen Abbott. ISBN 978-1-4939-2711-1

Reference. Not required to purchase.

1. *A First Course in Real Analysis*, 2nd edition, by Murray Protter and Charles Morrey.
2. *Introduction to Real Analysis*, 3rd or 4th edition, by Robert Bartle.
3. *Analysis with an Introduction to Proof*, 4th or 5th edition, by Steven Lay.
4. *Introduction to Calculus and Analysis Volume I,* by Richard Courant and Fritz John.
5. *How to Study as a Math Major*, 1st edition, by Lara Alcock.

Reading notes: Students must complete the reading, take notes and answer the questions before each class. Notes will be checked during class.

Assignments: Homework assignments are given weekly, and are due at the beginning of the next class meeting. Late homework will NOT be accepted. There are 8—12 regular problems and 1 professional problem.

- The professional problem is worth 10 points and is due at 11:59 pm on the Saturday of the week. It must be properly typed up in LaTEX with minimum spelling or grammatical errors. Submit a PDF output file to the dropbox of D2L using file name **MATH301_HWxx_FirstnameLastname.pdf**. For example, **MATH301_HW01_JoeSmith.pdf**.
- Regular problems are worth 20 points. You may type or handwrite them, but your work must be presented in the assigned order, the writing must be clear and the penmanship comprehensible. The total of all available points may exceed 20 points, and you are encouraged to do as many problems as possible.

Paper and Presentation: Students will form groups of 2 to 3 and work on a mini paper. Groups will also present their papers on the last class meeting. Paper and presentation are worth 50 points.

Quizzes: There is a check-in quiz in the beginning of the class, and a check-out quiz in the end. The score is zero for each missed quiz; there is no make-up quiz.

Exams: There are two 3-hour exams. Each exam is worth 200 points, and the passing score is 140 points, or 70%. Exams will be graded and return in the following class. Students must make up failed exams within two weeks.

Testing Center: Phone: 651-793-1460; email: testing.center@metrostate.edu

Course Requirements and Grading Policy: Your final score is determined by reading notes (55 points), homework (330 points), quizzes (165 points), two exams (400 points), and paper and presentation (50 points). Students without passing scores in both exams automatically fail the course. Students with passing exams are graded based on the following scale.

Points	930—1000	900—929	870—899	830—869	800—829	770—799	730—769	700—729	600—699	0—599
Grade	A	A-	B+	B	B-	C+	C	C-	D	F

Policy on Academic Integrity: The Metropolitan State University Student Handbook states "*In simple terms, plagiarism is using another person's words or ideas and presenting them as your own, without acknowledging the original source. This is a serious academic offense. Academic sanctions can include receiving a failing grade for an assignment or an entire course*."
Assignments and exams are to be completed independently unless specified otherwise. Copying and/or utilizing another person's work in order to complete your assignments or exams constitutes plagiarism. In situations where I suspect academic dishonesty, I reserve the right to either reassess your understanding of the material or assign a grade of 0 points. Repeated offenses will result in a grade of F for the entire course. For additional information on the university's policies regarding plagiarism, please refer to the student handbook found at http://www.metrostate.edu/msweb/pathway/gateway/handbook/handbook.html.

Classroom Diversity: The instructor strives to provide a welcoming learning environment to students of diverse backgrounds with diverse learning needs. Students who have questions or concerns about the course policy or how the course is conducted are encouraged to discuss them with the instructor.

Students with Disabilities: Special accommodations can often be made for those with learning disabilities. Students who have or may have documented learning disabilities are recommended to contact the instructor as well as the Disability Services Office at (651) 793-1540 or (651) 772-7687.

Email Communication: In accordance with University's policy, this class will use your university email address (name@metrostate.edu) to communicate with you about all course-related matters.

Tentative Schedule:

Week	Dates	Coverage	Work due
1	Aug. 23	Direct and indirect proofs, preliminary knowledge and the Axiom of Completeness • Appendix A, [Abbott] 1.2, 1.3	
2	Aug. 30	Mathematical induction, consequences of completeness and cardinality • Appendix B, [Abbott] 1.4, 1.5	HW01 and QZ01
3	Sep. 6	Nested quantifiers, limit of sequences, limit theorems and the Monotone Convergence Theorem • Appendix C, [Abbott] 2.2—2.4	HW02 and QZ02
4	Sep. 13	The Bolzano-Weierstrass Theorem and the Cauchy criterion • [Abbott] 2.4—2.6	HW03 and QZ03 **Paper group names due**
5	Sep. 20	Infinite series and basic topology • [Abbott] 2.7, 3.2, 3.3	HW04 and QZ04
6	Sep. 27	**Exam I.** Coverage: Weeks 1—5.	
7	Oct. 4	Limit of functions and continuous functions • [Abbott] 4.2, 4.3	HW05 and QZ05 **Exam I returned**
8	Oct. 11	Continuous functions on compact sets and the Intermediate Value Theorem • [Abbott] 4.4, 4.5	HW06 and QZ06 **Paper proposal due**
9	Oct. 18	Discontinuities and derivatives • [Abbott] 4.6, 5.1, 5.2	HW07 and QZ07 **Last day to make up Exam I**
10	Oct. 25	Intermediate value property, the Mean Value Theorem and a continuous but nowhere differentiable function • [Abbott] 5.2—5.4	HW08 and QZ08
11	Nov. 1	Uniform convergence of functions and uniform convergence and differentiation • [Abbott] 6.2, 6.3	HW09 and QZ09 **Paper first draft due**
12	Nov. 8	**Exam II.** Coverage: Weeks 7—11.	
13	Nov. 15	Series of functions and power series and Taylor series • [Abbott] 6.5, 6.6	HW10 and QZ10 **Exam II returned**
14	Nov. 22	The Weierstrass Approximation Theorem • [Abbott] 6.7	HW11 and QZ11
15	Nov. 29	**Final paper and presentation**	**Last day to make up Exam II**

Last update: 8/9/2016