

# Math 30800-R: Bridge to Advanced Mathematics, Fall 2016

*Mathematics Department, City College of New York, NAC 8/133*

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**Office:** NAC 6/202A    **Office Hours:** Tu & Th 3:00-3:30, and by appointment

**Math 30800-R** meets on **Tuesday & Thursday, 3:30-4:45 PM in NAC 6/111**

**First class:** 8/25. **Last class:** 12/8. **No class** on 10/4, 10/6, 10/11, 11/24. **Class on Fri** 10/14.

**Texts:** [CPZ] *Mathematical Proofs: A Transition to Advanced Mathematics*, G. Chartrand, A. D. Polimeni, P. Zhang, 3rd edition, Pearson. (Ch. 1-10 and parts of Ch. 11.)

[R] *Elementary Analysis: The Theory of Calculus*, K. A. Ross, 2nd edition, Springer. (Ch. 1)

**Course webpage:** <http://www.samvangool.net/2016-fall-308R/> (calendar, homework)

**Mathematics Department webpage:** <http://math.sci.ccny.cuny.edu/>

**Goals of class:** learn how to write proofs, understand and logically manipulate mathematical statements, know fundamental concepts of abstract mathematics: logic, sets, functions, cardinality, integers, rationals and reals.

## **Exams:**

Two in class-exams will be scheduled during the semester. The final exam will take place in late December. **If you need to miss an in-class exam**, notify me by email **before** the start of the exam. **If you will need to be absent for a religious holiday**, notify me by email **before** September 6<sup>th</sup>.

## **Homework:**

Writing proofs, one of the main goals of this course, can only be learned by doing it yourself. Homework is therefore crucial for success in this class. Homework will be assigned every week (approximately, see online calendar) and is due at the beginning of the next class (on paper or via email). Feedback will be provided on a selection of exercises.

**Academic Integrity:** Discussing homework problems with others is useful, but **copying** another person's solutions is not. You should indicate who you worked with on which problems. You should write your final solutions yourself. If you use any outside sources (e.g., the internet), you should say so and give the link or reference. The CUNY policy on Academic Integrity applies to this course: [https://www.cuny.edu/about/administration/offices/la/Academic\\_Integrity\\_Policy.pdf](https://www.cuny.edu/about/administration/offices/la/Academic_Integrity_Policy.pdf)

## **Grade computation:**

Your class average is determined by

- Two midterm exams (2 x 20% = 40%)
- Homework (20%)
- Final (40%)

**Attendance:** It is every student's own responsibility to **attend** every class and **not be late**.

**Cell phone:** As a courtesy to your peers and to the instructor, please **do not use** your cell phone and ensure that it is **not seen nor heard** at any time during class.

## COURSE LEARNING OUTCOMES

**DEPARTMENT:** Mathematics  
**COURSE #:** 30800  
**COURSE TITLE:** Bridge to Advanced Mathematics  
**TERM OFFERED:** Fall 2016  
**PRE-REQUISITES:** Departmental permission  
**PRE/CO-REQUISITES:** None  
**HOURS/CREDITS:** 3hrs/3credits  
**DATE EFFECTIVE:** 1/24/16  
**COURSE COORDINATOR:** Hooper

**CATALOG DESCRIPTION :** This course explores the logical and foundational structures of mathematics, with an emphasis on understanding and writing proofs. Topics include set theory, logic, mathematical induction, relations and orders, functions, Cantor's theory of countability, and development of the real number system.

**Textbooks:**

- *Mathematical Proofs*, 3<sup>rd</sup> edition, by Chartrand, Polimeni, and Zhang; Addison-Wesley Publ.
- *Elementary Analysis*, 2<sup>nd</sup> edition, by Ross, Springer Publ.

**COURSE LEARNING OUTCOMES:**

<i>After taking this course, the student should be able to:</i>	Contributes to Departmental Learning Outcomes:
1. Demonstrate an ability to understand and manipulate mathematical statements involving quantifiers and logical connectives. Examples of manipulations include finding the negation, converse, and contrapositive of a quantified implication.	a, g
2. Write clear and rigorous proofs (or disproofs) of mathematical statements utilizing basic proof techniques including direct proof, proof by contrapositive, proof by contradiction, proof by cases, mathematical induction, and by providing an example (or counterexample).	e1, e2, f, g
3. Demonstrate knowledge of fundamental concepts of mathematics including those relating to logic, sets, functions, relations, cardinality, integers, rationals and reals. Precisely state fundamental definitions, axioms and theorems and utilize them to prove related results.	a, e1, e2, f, g

**COURSE ASSESSMENT TOOLS:**

1. Homework (20%)
2. Midterms (40%)
3. Final Exam (40%)

**DEPARTMENTAL LEARNING OUTCOMES:**

*The mathematics department, in its varied courses, aims to teach students to:*

- a. perform numeric and symbolic computations
- b. construct and apply symbolic and graphical representations of functions
- c. model real-life problems mathematically
- d. use technology appropriately to analyze mathematical problems
- e. state (e1) and apply (e2) mathematical definitions and theorems
- f. prove fundamental theorems
- g. construct and present (generally in writing, but, occasionally, orally) a rigorous mathematical argument.