UNIVERSITY OF PUERTO RICO
RIO PIEDRAS CAMPUS
DEPARTMENT OF MATHEMATICS

ANALYSIS
PH.D. QUALIFYING EXAM
SYLLABUS

The qualifying exam in Analysis is based on the material in Real Analysis I, including the Lebesgue integral, and Complex Analysis I. Of course, the students have to master undergraduate courses such as Multi-variable Calculus and Advanced Calculus.

The exam serves two purposes:

1. Test the students' understanding (not memorization) of examples, theorems, basic techniques, and interrelations between theorems in the above two courses.
2. Test the mathematical insight and originality of the students. The student who passes the exam must show his/her ability to do original research in the future.

The exam will emphasize the second purpose. Therefore, to solve some problems, the students have to construct examples, counterexamples, or use theorems creatively. One possibility is the following: the standard theorem is not strong enough to solve the problem; so the students should recognize the situation, generalize the theorem, and apply the generalization.

There will normally be six problems in the exam. Each problem is worth 20 points. Only the five best solutions of each student will be counted. The passing score is 70 points or more. There may be more than 6 problems in the exam, but still only the 5 best solutions will be counted.

Textbooks

1. J. B. Conway, *Functions of One Complex Variable I*, Springer-Verlag, 1986. (Chapter I-Chapter IX)
2. L. Ahlfors, *Complex Analysis, Third Edition*, McGraw-Hill, 1979.

3. W. Rudin, *Principles of Mathematical Analysis, Third Edition*, McGraw-Hill, 1976.
4. H.L. Royden, *Real Analysis, Third Edition*, Macmillan Publishig Company, 1988.