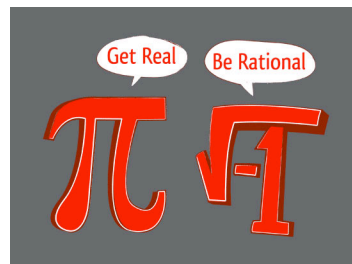# Claremont McKenna College, Spring 2015
MATH 195: Transcendental Number Theory

Instructor: Lenny Fukshansky, Adams Hall 218, (909) 607 - 0014, lenny@cmc.edu
Time: Tuesdays and Thursdays, 2:45 – 4:00 pm

Prerequisites: MATH 60 is required, but either MATH 171 or MATH 131 is recommended, mainly for the purposes of mathematical maturity. The necessary ideas from algebra and analysis will be covered in class, as needed. I am happy to talk to anyone interested in this course to discuss if their background is sufficient.

Text: Lecture notes will be provided.

Course Description: We have used polynomials with integer coefficients since elementary school. We also know that some such polynomials may not have real roots, but they always have complex roots. But can there be a complex number that is not a root of any such polynomial? These are the transcendental numbers. For centuries people suspected that such numbers exist, and even conjectured that e and π are transcendental, but a proof of this fact was first obtained only at the end of the 19th century. Transcendental numbers appear to be notoriously hard to explicitly construct. An amazing fact, however, is that almost all complex numbers are in fact transcendental!

In this course we will cover a selection of classical topics from the theory of transcendental numbers and the closely related area of Diophantine approximations. These are beautiful and exciting branches of mathematics, which have truly flourished in the 19th and 20th centuries and have been distinguished by several Fields Medal awards. We will discuss such celebrated results as Dirichlet's theorem, Liouville's construction of the first transcendental number, transcendence of e and π and generalizations, Thue-Siegel-Roth theorem, and many others.

Course format and grading: This is a special topics class, and regular attendance of the lectures is crucial to the understanding of the material. In addition to the lecture notes, there will be suggested homework exercises. Grading will be based on one midterm exam, as well as on the final exam or project.

Registration is open to students from all of the Claremont Colleges, and I am happy to talk to anyone interested in this course!