Syllabus for Math 506 Graduate Representation Theory, Fall 2018
341 Altgeld. Tuesdays and Thursdays 9:30 - 10:50am

Instructor: Dr. Chelsea Walton

Email and Office Location: notlaw@illinois.edu, 374 Altgeld.

Office Hours: Tuesdays and Thursdays 11:00am - noon, and by appointment.

Course website: https://faculty.math.illinois.edu/~notlaw/teaching.html#current

Textbook: A Tour of Representation Theory by Martin Lorenz, to be published by the AMS. A prepublication copy was made available to me and, with the permission of the author, I will distribute this to the course. I will also provide supplementary material when needed.

Course Objectives: As Lorenz remarks:

> The objective of representation theory is to investigate the different ways in which a given algebraic object –such as an algebra, a group, or a Lie algebra– can act on a vector space. The benefits of such an action are at least twofold: the structure of the acting object gives rise to symmetries of the vector space on which it acts; and, in the other direction, the highly developed machinery of linear algebra can be brought to bear on the acting object itself to help uncover some of its hidden properties. Besides being a subject of great intrinsic beauty, representation enjoys the additional benefit of having applications in myriad contexts other than algebra, ranging from number theory, geometry and combinatorics to general physics, quantum field theory, and the study of molecules in chemistry.

I will cover the representation theory of algebras and of groups in detail (Parts I and II of Lorenz's text), and I will also provide some material on the representation of Lie algebras (Part III) and of Hopf algebras (Part IV) as time permits. See the Schedule on the course website for more details.

Grading: 100% of your grade is based on Homework. I will assign 75 problems throughout the semester, and you will need to complete at least 30 problems to earn a B in the course, and at least 50 problems to earn an A. If your (future) area of research involves representation theory, then completing 70+ problems is advised. See the Schedule on the course website for assignments and due dates.

<p align="center">Homework sets are due at start of class on the due date and
no late submissions are allowed without an official excuse.</p>

Handwritten and Latex-ed solution sets are both acceptable. As usual, you are expected to write up your own solutions; please acknowledge any references (to theorems, exercises, etc) and collaborations with peers when pertinent. Emailed submissions are accepted as long as they arrive before the deadline.

Grader: Shiyu Shen, sshen16@illinois.edu