Syllabus for MTH 782:
Character Varieties and 3-dimensional topology

University of Miami, Fall 2025

www.math.miami.edu/~cscaduto/teaching/782-fall-2025/

Instructor:

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Office: Ungar 525
Office hours: Thurs 12:30-1:30, or by appointment

Class time and location:

Tuesday and Thurday 11 AM - 12:15 PM, Ungar 406

References: See the course webpage.

Description:

In this course we will study the role that character varieties have played in the development of 3-dimensional topology. The first part of the course will feature a detailed study of $SU(2)$ character varieties of knots, and, with a bit of help from Floer theory, how they fit into problems on Dehn surgery and other aspects of 3-manifolds. The second part of the course will be on the Culler–Shalen theory of $\mathrm{SL}_2(\mathbb{C})$ character varieties and its applications to several important classical results for 3-manifolds. In the remaining time, more recent and open-ended research, related to $SU(2)$, $\mathrm{SL}_2(\mathbb{C})$ and $\mathrm{SL}_2(\mathbb{R})$ character varieites, will be discussed.

Grading:

This is a topics course for graduate students and there are no exams. You will be given the following option: hand in solutions to a collection of assigned exercises, or write an expository account of a topic related to the course material. More details will be given in the course.

Standard university policies are assumed for this course. See for example
https://bulletin.miami.edu/general-university-information/graduate-policies-and-procedures/academic-policies/