

# Syllabus for MTH 783: Character Varieties and 3-dimensional topology

University of Miami, Fall 2025

[www.math.miami.edu/~cscaduto/teaching/782-fall-2025/](http://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 Thursday 11 AM - 12:15 PM, Ungar 411

**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  $SL_2(\mathbb{C})$  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  $SU(2)$ ,  $SL_2(\mathbb{C})$  and  $SL_2(\mathbb{R})$  character varieties, 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/>