

**Target group:** PhD students and postdocs in mathematics & mathematical physics

**Course Title:** **Advanced Topics in Quantum Mathematics**

**Extend:** 3 hours per week / 15 weeks / 5 ECTS

**Aims:** The primary aim of this course is to introduce students to advanced topics in quantum mathematics. The topics are beyond those typically found in PhD level courses and will be targeted towards specific thesis problems of current PhD students, while still being valuable for all PhD students and postdocs in adjacent areas. Another aim is for students to practice giving a math lecture. Students will learn how to manage time constraints during a talk and how to field questions from the audience.

**Synopsis:** Possible topics include topological quantum field theories, quantum invariants of knots, quantum groups, geometric quantization, topological quantum computation, topological recursion, resurgence, Chern-Simons theory, etc. The topics will be decided at the beginning of the semester based on the common interests of the students. Then, the specific content and relevant academic literature will be organized and determined by the instructor.

Each week, one student will give a two-hour presentation based on one of the topics being covered. Following the presentation, there will be a one-hour discussion, in which the students will discuss the topics under the supervision of the instructor.

**Evaluation method:**

The evaluation will be based on a two-hour presentation by each student in class (using the hours allocated for the course) on one of the topics covered in the course. The lecturer and an internal censor will be present during the talk to evaluate the presentation and ask the student questions. The evaluation will be pass/fail.

**Teaching method:** In person lectures

**Responsible lecture(s)** Guillermo Ayuso, Greyson Potter, Bingyu Zhang

**Literature** The literature will vary each semester, depending on the topics, and it will include textbooks as well as published, peer-reviewed research articles. After the topics are chosen, the instructor will provide a detailed list of the relevant literature.