

Math 595 Interacting many-particle systems

Kay Kirkpatrick

2 credits, first 8 weeks of Spring 2017 semester

CRN: 64837

Prerequisites: some linear algebra, probability, PDE, and quantum mechanics--or a willingness to catch up through studying.

Primary text: Chapters written by Seiringer, Solovej, and Spencer in the book Quantum Many Body Systems, ed. Giuliani, Mastropietro, and Yngvason, Lecture Notes in Mathematics Vol. 2051, Springer (2012) <http://link.springer.com/book/10.1007%2F978-3-642-29511-9>

Brief syllabus: This course will provide an introduction to the mathematical theory of quantum many-body systems, including the many-particle Schrodinger equation and its various limits such as the Hartree and Gross-Pitaevskii (cubic nonlinear Schrodinger) equations. If time permits and if there is interest among the audience, some topics include: mean-field interactions, Coulomb interactions, localizing mean-field-type interactions, quantum probability, and quantum groups.

The grading will be based on weekly homework and a final project. The project consists of
1) reading and understanding some papers or sections of books that are closely related to the course,

2) organizing what you learned, so that other students could learn it quickly,

3) preparing a written paper or an oral presentation, including an overview, motivation, some main ideas, and possibly some technical details.