

Barbara Skrzypek

Curriculum Vitae

"I was born not knowing, and have had only a little time to change that here and there" - Richard Feynman

Education

- 2013–Present **BS in Physics**, Loyola University Chicago, GPA – 4.0.
- 2013–Present **BS in Mathematics**, Loyola University Chicago, GPA – 4.0.
- 2013–Present **Honors Interdisciplinary Program**, Loyola University Chicago, .

Relevant Coursework

Mathematical Methods in the Physical Sciences

Professor David Slavsky
Spring 2014

This course focused heavily on the mathematical aspect of physics, introducing important topics such as Fourier series expansions, vector calculus, solving differential equations (with special emphasis on Legendre polynomials), and solving basic partial differential equations. This course made extensive use of the software package Mathematica, with which various programming techniques and loops were learned and practiced to solve problems and program. An end-of-semester project included modeling spread of infectious diseases using Mathematica.

Electronics and Electronics Lab

Professor Robert Polak
Spring 2015

This course explored analog and digital electronics, covering direct and alternating circuits, solid state devices, and operational amplifiers. The experiments provided familiarity with electronic components central to most electronic applications such as diodes and transistors. An end of semester project included building, analyzing, and presenting an important circuit. The circuit investigated in this particular project was the comparator, a device that converts an analog signal to digital.

Quantum Mechanics II

Professor Asim Gangopadhyaya
Fall 2015

This course continued off of Introductory Quantum Mechanics, covering more advanced topics in quantum mechanics such as systems of N degrees of freedom, quantum statistics, time-dependent perturbation theory, symmetries and angular momentum, scattering theory, relativistic quantum mechanics, and quantum field theory, among others. Relevance to physical applications were discussed, including but not limited to laser beams and stimulated emission, the Helium atom, astrophysical implications of the Pauli exclusion principle, etc.

Differential Geometry (Special Topics)

Professor Adam Spiegler
Planned course for the spring. Specific content of the course and topics covered to be provided next semester.
Spring 2016

Relevant Experience

FRESHMAN PROJECTS, Advisor: Dr. John Cunningham

Spring 2014 **Nonlinear Dynamical Processes.**

Collaborated with a group of physics majors on a research project that examined the behavior of nonlinear dynamical systems and investigated chaos theory. To do so, we built a double pendulum, with which we looked at dependence on initial conditions at high starting angles, using a model on Mathematica to aid us.

RESEARCH: Advisor: Dr. Robert McNees

Spring 2015 - **Scalar and Tensor Fields in Kerr Spacetime.**

Present Preliminary topics such as the Schwarzschild Solution, scalar-tensor theories of gravity, rotating (Kerr) black holes, stability, and gauge theory were covered before starting the project. As part of the project, we investigate solutions to nonhomogeneous differential equations describing scalar and tensor fields propagating in Kerr spacetime.

RESEARCH: Advisor: Dr. Jon Bougie

Spring 2015 - **Solutions to Navier-Stokes Equations in Unstable Granular Systems.**

Present Solutions to Navier-Stokes Equations are well known for an unstable granular medium. Solutions to Navier-Stokes Equations for Unstable Granular Systems conducting fluid. We look for a base state which would help solve the equations for a system of vertically-oscillated grains at critical amplitude (undergoing pattern formation). To do so, we analyze continuum simulations of below-onset systems.

Awards

- 2013 *District 207's Best for Academic Achievement*—awarded to four seniors per high school in recognition of academic achievement
- 2014 *Father Gerst Memorial Award for Excellence in Physics*—awarded to three freshman physics majors
- 2015 *Duchossois Scholarship*—granted to Loyola undergraduates who have demonstrated academic achievement
- 2013-Present *Membership in the National Society for Collegiate Scholars*—an organization which selects students from the top 20 percent and which mainly organizes charity events

Languages

English **Fluent**
Spanish **Conversationally fluent**
Polish **Fluent**