Name: Riley Brady

Program of Study

Listed are the courses in science and engineering, applied mathematics, and computer science that you agreed to take on your proposed Program of Study.

University: University of Colorado Boulder

Course number	Course Title	Credit hours	Term and Year	Grade	Academic Level
Science/Engineering					
ATOC 5060	Dynamics of the Atmosphere and Ocean	3S	Spring 2017		G
ATOC 5200	Biogeochemical Oceanography	3S	Spring 2017		G
Mathematics and Statistics					
APPM 5540	Introduction to Time Series	3S	Spring 2018		G
APPM 5720	Methods and Analysis of Large Data Sets (Special Topics)	3S	Spring 2018		G
Computer Science					
ATOC 6100	Modeling Weather and Climate	3S	Fall 2017		G
CSCI 5576	High-Performance Scientific Computing	4S	Fall 2017		G

I have read this program of study and affirm that, in my opinion, it satisfies the fellowship program requirements. This POS has been approved by my advisor, **Nicole Lovenduski**, and I understand that, if offered a fellowship, my advisor and I are required to sign this page and send it to the Krell Institute.

Student's signature _____ Date _____

Graduate Advisor: **Nicole Lovenduski**
Graduate Advisor's Institute: **University of Colorado Boulder**
Graduate Advisor signature _____ Date _____

Krell Institute (Office use only) _____

Krell Institute, Attn: DOE CSGF Coordinator
1609 Golden Aspen Drive, Suite 101, Ames, IA 50010
Phone: 515-956-3696, Fax: 515-956-3699, csgf@krellinst.org

Name: Riley Brady

Course Description

ATOC 5060: Dynamics of the Atmosphere and Ocean

Provides a physical and mathematical understanding of the dynamics of the atmosphere and ocean, with a focus on its fluid dynamical nature. The course will build on what you learned in ATOC 5050, and covers the basic equations of atmospheric and oceanic dynamics, the wave phenomena present in the atmosphere and ocean, instability theory, and turbulence.

ATOC 5200: Biogeochemical Oceanography

Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks, and much more.

APPM 5540: Introduction to Time Series

Single and multivariable regression, forecasting using regression models, time series models, and modeling with MA, AR, ARMA, and ARIMA models, forecasting with time series models, and spectral analysis.

APPM 5720: Methods and Analysis of Large Data Sets (Special Topics)

Focuses on the power of statistical methods to deal with data that would be difficult to interpret using elementary statistics and limited graphics. Some overall themes include the ability to recognize different types of data and statistical questions and to identify the statistical tools that are appropriate for the situation.

ATOC 6100: Modeling Weather and Climate

Discusses background theory and procedures used for modeling climate on a variety of space and time scales. Includes numerical simulation of weather and climate with models in a hierarchy of complexity, assessments of error growth, prediction of circulations and impact of radiative and other influences. Explores various numerical methods, develops core computing skills, and considers data handling and visualization.

CSCI 5576: High-Performance Scientific Computing

Introduces computing systems, software, and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer.

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Other Planned Courses

Listed are the other courses you plan to take that you believe are particularly pertinent to your proposed or current research in the areas of Mathematics, Science and Engineering, and Computer Science.

Course number	Course Title	Credit hours	Term and Year	Grade	Academic Level
Science/Engineering					
ATOC 5050	Introduction to Atmospheric Dynamics	3S	Fall 2016		G
ATOC 5051	Introduction to Physical Oceanography	3S	Fall 2016		G
ATOC 5235	Introduction to Atmospheric Radiative Transfer and Remote Sensing	3S	Spring 2017		G
ATOC 5300	The Global Carbon Cycle	3S	Fall 2017		G
ATOC 7500	Physical Oceanography and Climate (Special Topics)	3S	Fall 2018		G
Mathematics and Statistics					
APPM 5470	Partial Differential and Integral Equations	3S	Fall 2016		G

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Course Description

ATOC 5050: Introduction to Atmospheric Dynamics

Covers atmospheric motion and its underlying mathematical and physical principles. Explores the dynamics of the atmosphere and the mathematical laws governing atmospheric motion. Topics include atmospheric composition and thermodynamics, conservation laws, geostrophic balance, vorticity dynamics, boundary layers, and baroclinic instability.

ATOC 5051: Introduction to Physical Oceanography

Provides fundamental knowledge of the basic dynamics of the ocean.

ATOC 5235: Introduction to Atmospheric Radiative Transfer and Remote Sensing

Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget.

ATOC 5300: The Global Carbon Cycle

Covers the role of the ocean, terrestrial biosphere, and atmosphere in the global carbon cycle. Specific topics include marine carbonate chemistry, biological production, terrestrial fluxes, anthropogenic emissions, and the evolution of the global carbon cycle in a changing climate.

ATOC 7500: Physical Oceanography and Climate (Special Topics)

A quantitative introduction to the field of physical oceanography, with special emphasis on the ocean's interaction with the atmosphere and role in the global climate system. Topics include the ocean's heat and salt budgets, the equations of motion, wind-driven and thermohaline circulations, equatorial oceanography, ocean-atmosphere coupling, natural climate variability such as El Niño, and the ocean's role in--and response to--anthropogenic climate change. Theory is complemented by exposure to state-of-the-art instrumental data, satellite observations, and numerical models.

APPM 5470: Partial Differential and Integral Equations

Studies properties and solutions of partial differential equations. Covers methods of characteristics, well-posedness, wave, heat and Laplace equations, Green's functions, and related integral equations.
