

# PH.D. IN WATERSHED SCIENCE

Sustainable management of freshwater resources is an increasingly important and complex challenge in Colorado and worldwide, and we need scientists who can address complex water issues. The watershed science program focuses on how water moves through the landscape, what factors affect its quality, and how to manage water resources. Students in the Ph.D. in Watershed Science program work closely with research scientists in the classroom, laboratory, and field on both basic and applied watershed science research. Students are exposed to cutting-edge field, data analysis, and modeling techniques through flexible programs of study and access to a breadth of water-related courses throughout the university. Students also have opportunities to participate in seminars and field courses.

The Ph.D. in Watershed Science requires 72 credits, most of which are research credits. Coursework includes in-depth classes in the student's area of research, as well as classes that expand into other disciplines. Each student develops an individualized program of study with the guidance and approval of the student's graduate committee. Students in the Ph.D. program develop new contributions to the literature of the watershed science discipline.

[Students interested in graduate work should refer to the Graduate and Professional Bulletin.](#)

## Learning Objectives

Upon successful completion, students will have valuable skills in the following areas:

- Systems understanding:** Identify and distinguish systems components and their interactions to explain, illustrate and analyze system understanding.
- Watershed science content and principals:** Apply complex watershed science principals to complex problems to develop sustainable solutions.
- Problem solving:** Work in teams and communicate effectively using a diverse set of analytical and applied tools.
- Interdisciplinary understanding:** Work in an interdisciplinary environment and demonstrate respect for alternative points of view.
- Research:** Contribute new research and understanding of watershed processes and issues to the published literature of the discipline.

## Requirements Effective Fall 2024

Code	Title	Credits
<b>Required Foundation Courses</b>		
GRAD 544	Ethical Conduct of Research	1
<b>Discussion Courses</b>		
Select at least 3 credits from the following:		3
WR 574	Advanced Snow Hydrology	
WR 616	Hillslope Hydrology and Runoff Processes	
<b>Quantitative Courses</b>		
Select at least 3 credits from the following:		3

ESS 523A	Environmental Data Science Applications: Introduction	
NR 512	Spatial Statistical Modeling-Natural Resources	
NR 523/STAT 523	Quantitative Spatial Analysis	
STAR 511	Design and Data Analysis for Researchers I	
STAR 512	Design and Data Analysis for Researchers II	
WR 523C/ESS 523C	Environmental Data Science Applications: Water Resources	
WR 674	Data Issues in Hydrology	
<b>Skill Courses</b>		
Select at least 3 credits from the following:		3
GEOL 551	Groundwater Modeling	
GEOL 554	Remote Sensing of the Earth System	
NR 503/GR 503	Remote Sensing and Image Analysis	
NR 505	Concepts in GIS	
WR 417	Watershed Measurements	
WR 419	Water Quality Analyses	
WR 524/CIVE 524	Modeling Watershed Hydrology	
WR 575	Snow Hydrology Field Methods	
<b>Depth and Breadth Courses</b>		
Select at least 6 credits from the following:		6
AREC 542	Applied Advanced Water Resource Economics	
CIVE 515	River Mechanics	
CIVE 520	Physical Hydrology	
CIVE 544	Water Resources Planning and Management	
CIVE 613	River Restoration Design	
CIVE 622	Risk Analysis of Water/Environmental Systems	
CIVE 625	Quantitative Eco-Hydrology	
CIVE 626	Integrated Analysis of Coupled Water Issues	
ESS 501	Principles of Ecosystem Sustainability	
ESS 543/ATS 543	Global Climate Change	
ESS 660	Biogeochemical Cycling in Ecosystems	
GEOL 452	Hydrogeology	
GEOL 552	Advanced Topics in Hydrogeology	
GEOL 652	Fluvial Geomorphology	
NR 510	Ecosystem Services--Theory and Practice	
NR 577	Wetland Ecology and Restoration	
SOC 461	Water and Social Justice	
SOC 664	Sociology of Water Resources	
SOCR 522	Micrometeorology	
SOCR 540	Soil-Plant-Nutrient Relationships	
SOCR 670	Terrestrial Ecosystems Isotope Ecology	
WR 416	Land Use Hydrology	
WR 418	Land Use and Water Quality	
WR 510	Watershed Management in Developing Countries	
WR 511	Water Resource Development	
WR 512	Water Law for Non-Lawyers	

Research and Dissertation		
WR 798	Research	2
WR 799	Dissertation	2
<b>Additional Credits (A maximum of 30 credits may be accepted from a master's degree toward the Ph.D.)</b>		<b>52</b>
<b>Program Total Credits:</b>		<b>72</b>

A minimum of 72 credits are required to complete this program.

## Requirements for All Graduate Degrees

For more information, please visit Requirements for All Graduate Degrees (<https://catalog.colostate.edu/general-catalog/graduate-bulletin/graduate-study/procedures-requirements-all-degrees/>) in the Graduate and Professional Bulletin (<https://catalog.colostate.edu/general-catalog/graduate-bulletin/>).

## Summary of Procedures for the Master's and Doctoral Degrees

NOTE: Each semester the Graduate School publishes a schedule of deadlines. Deadlines are available on the Graduate School website (<https://graduateschool.colostate.edu/deadline-dates/>). Students should consult this schedule whenever they approach important steps in their careers.

Forms (<https://graduateschool.colostate.edu/forms/>) are available online.

Step	Due Date
1. Application for admission (online)	Six months before first registration
2. Diagnostic examination when required	Before first registration
3. Appointment of advisor	Before first registration
4. Selection of graduate committee	Before the time of fourth regular semester registration
5. Filing of program of study (GS Form 6)	Before the time of fourth regular semester registration
6. Preliminary examination (Ph.D. and PD)	Two terms prior to final examination and PD)
7. Report of preliminary examination (GS Form 16) - (Ph.D. and PD)	Within two working days after results are known
8. Changes in committee (GS Form 9A)	When change is made
9. Application for Graduation (GS Form 25)	Refer to published deadlines from the Graduate School Website
9a. Reapplication for Graduation (online)	Failure to graduate requires Reapplication for Graduation (online) for the next time term for which you are applying
10. Submit thesis or dissertation to committee	At least two weeks prior to the examination or at the discretion of the graduate committee
11. Final examination	Refer to published deadlines from the Graduate School Website

12. Report of final examination (GS Form 24)	Within two working days after results are known; refer to published deadlines from the Graduate School website
13. Submit a signed Thesis/Dissertation Submission Form (GS Form 30) to the Graduate School and Submit the Survey of Earned Doctorates (Ph.D. only) prior to submitting the electronic thesis/dissertation	Refer to published deadlines from the Graduate School website.
14. Submit the thesis/dissertation electronically	Refer to published deadlines from the Graduate School website
15. Graduation	Ceremony information is available from the Graduate School website