

# MAJOR IN RESTORATION ECOLOGY

The Major in Restoration Ecology emphasizes interdisciplinary study, research, and restoration of damaged, degraded or destroyed rangelands and forested ecosystems of the world. More specifically, this major focuses on the restoration of rangelands and forests for multiple uses. These uses include both consumptive and non-consumptive activities such as recreation, preservation of wildlife habitat, providing for aesthetic beauty, livestock grazing, and timber production. Forests and rangelands occupy the vast majority of the earth's land surface and Colorado is an ideal setting for the study of restoration ecology with many different types of rangeland and forest ecosystems in close proximity.

Students in this program will gain the important knowledge and skills necessary to restore damaged ecosystems. They will learn how to manipulate soil, water, vegetation and animal resources in order to implement successful restoration for local, state and federal land management agencies as well as for a variety of private entities, landowners and non-governmental agencies. Students develop an in-depth understanding of basic plant and animal biology; a basic understanding of the physical sciences as they relate to restoration ecology; knowledge of important concepts of ecology and natural resources management; an understanding of economics related to evaluating alternatives; and analytical and decision-making skills. Students also develop communication, political and interpersonal skills to make their education effective. Examples of career opportunities include, but are not limited to restoration ecologist, soil conservationist, plant ecologist, riparian ecologist, researcher, commercial sales and service representative, consultants, and mine reclamation specialist.

## Learning Objectives

Students will:

1. Accurately and effectively communicate their understanding of restoration ecology both verbally and in written form.
2. Demonstrate an understanding of the ways in which the ecological structure and functioning of natural resource systems are damaged, degraded or destroyed by disturbances.
3. Apply qualitative and quantitative measurement and analytical techniques to identify and evaluate objectives and metrics for restoration programs.
4. Demonstrate proficiency in working with diverse, multi-disciplinary and multi-stakeholder teams to develop and communicate goals, objectives, and prescriptions for overcoming limitations to restoration.
5. Demonstrate learning of subject areas outside their major study focus, including (but not restricted to) principles/issues in wildlife, water, recreation, wilderness, soil, rangeland, and fishery resources; students will also demonstrate knowledge of social science analytic techniques.
6. Develop vegetation/habitat management and restoration techniques and methods based on scientific insights that can be used to craft solutions responsive to unique challenges.
7. Be able to work together as a team to solve natural resource problems, taking into account ecological, social, government policy, and economic contexts, and the use of inquiry, analytical, integrative/synthetic, and communication skills.

## Requirements Effective Fall 2024

### Freshman

		AUCC	Credits
BZ 120	Principles of Plant Biology (GT-SC1)	3A	4
CHEM 107	Fundamentals of Chemistry (GT-SC2)	3A	4
CHEM 108	Fundamentals of Chemistry Laboratory (GT-SC1)	3A	1
CO 150	College Composition (GT-CO2)	1A	3
F 101	Intro to Forest and Rangeland Stewardship		1
NR 193	FRS First Semester Seminar		1
Select 3 credits from the following:			3
MATH 117	College Algebra in Context I (GT-MA1)	1B	
MATH 118	College Algebra in Context II (GT-MA1)	1B	
MATH 125	Numerical Trigonometry (GT-MA1)	1B	
MATH 141	Calculus in Management Sciences (GT-MA1)	1B	
1C ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc</a> )		1C	3
Arts and Humanities ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )		3B	6
Historical Perspectives ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )		3D	3

**Total Credits**

**29**

### Sophomore

BZ 223	Plant Identification		3
F 209	Introduction to Forest and Rangeland Ecology		3

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RS 300	Rangeland Conservation and Stewardship		3
SOCR 240	Introductory Soil Science		4
SPCM 200	Public Speaking		3
Select one course from the following:			3
FW 104	Wildlife Ecology and Conservation (GT-SC2)	3A	
NR 300	Biological Diversity		
Select one course from the following:			3
STAT 301	Introduction to Applied Statistical Methods		
STAT 307	Introduction to Biostatistics		
Social and Behavioral Sciences ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences</a> )			3C 3
Electives			4
<b>Total Credits</b>			<b>29</b>
<b>Summer</b>			
NR 220	Natural Resource Ecology and Measurements		5
<b>Total Credits</b>			<b>5</b>
<b>Junior</b>			
BSPM 308	Ecology and Management of Weeds		3
F 311	Forest Ecology		3
GR 204/WR 204	Sustainable Watersheds (GT-SC2)	3A	3
NR 319	Introduction to Geospatial Science		4
NR 320	Natural Resources History and Policy		3
RS 313/F 313	Dendrology and Herbaceous Plant ID		3
RS 378	Disturbance Ecology		2
Select one course from the following:			3-4
BZ 440	Plant Physiology		
HORT 260	Plant Propagation		
HORT 321	Nursery Production and Management		
Select one course from the following:			3
CO 300	Writing Arguments (GT-CO3)	2	
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
Elective			3
<b>Total Credits</b>			<b>30-31</b>
<b>Senior</b>			
NR 477	Restoration Case Studies Field Tour	4C	1
NR 479	Restoration Case Studies	4C	2
RS 432	Rangeland Measurements and Monitoring		2
RS 478	Ecological Restoration	4A,4B	3
Select one course from the following:			1-4
SOCR 341	Microbiology for Sustainable Agriculture		
SOCR 350	Soil Fertility Management		
SOCR 440	Pedology		
SOCR 442	Forest and Range Soils		
SOCR 455	Microbiomes of Soil Systems		
SOCR 456	Soil Microbiology Laboratory		
SOCR 467	Soil and Environmental Chemistry		
SOCR 470	Soil Physics		
SOCR 471	Soil Physics Laboratory		
Select one course from the following:			3-4

BZ 450	Plant Ecology			
BZ 471	Stream Biology and Ecology			
Select one course from the following:				3
F 324	Fire Effects and Adaptations			
F 325	Silviculture			
F 326	Wildland Fire Behavior and Management			
F 425	Advanced Wildland Fire Behavior and Management			
Electives <sup>1</sup>				8-11
<b>Total Credits</b>				<b>26-27</b>
<b>Program Total Credits:</b>				<b>120</b>

## Major Completion Map

<sup>1</sup> Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

### Freshman

Semester 1		Critical	Recommended	AUCC	Credits	
BZ 120	Principles of Plant Biology (GT-SC1)	X		3A	4	
F 101	Intro to Forest and Rangeland Stewardship	X			1	
NR 193	FRS First Semester Seminar	X			1	
Select 3 credits from the following:					3	
MATH 117	College Algebra in Context I (GT-MA1)			1B		
MATH 118	College Algebra in Context II (GT-MA1)			1B		
MATH 125	Numerical Trigonometry (GT-MA1)			1B		
MATH 141	Calculus in Management Sciences (GT-MA1)			1B		
Arts and Humanities ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )				X	3B	3
Historical Perspectives ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )				X	3D	3
<b>Total Credits</b>					<b>15</b>	

Semester 2		Critical	Recommended	AUCC	Credits	
CHEM 107	Fundamentals of Chemistry (GT-SC2)	X		3A	4	
CHEM 108	Fundamentals of Chemistry Laboratory (GT-SC1)	X		3A	1	
CO 150	College Composition (GT-CO2)	X		1A	3	
1C ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc</a> )		X		1C	3	
Arts and Humanities ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )				X	3B	3
AUCC 1B must be completed by the end of Semester 2.				X		
<b>Total Credits</b>					<b>14</b>	

### Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
BZ 223	Plant Identification	X			3
F 209	Introduction to Forest and Rangeland Ecology	X			3
RS 300	Rangeland Conservation and Stewardship	X			3
Electives				X	4
<b>Total Credits</b>					<b>13</b>

Semester 4		Critical	Recommended	AUCC	Credits
SOCR 240	Introductory Soil Science	X			4
SPCM 200	Public Speaking	X			3
Select one course from the following:				X	3

FW 104	Wildlife Ecology and Conservation (GT-SC2)			3A	
NR 300	Biological Diversity				
Select one course from the following:		X			3
STAT 301	Introduction to Applied Statistical Methods				
STAT 307	Introduction to Biostatistics				
Social and Behavioral Sciences ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences</a> )			X	3C	3
<b>Total Credits</b>					<b>16</b>
<b>Semester 5</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
NR 220	Natural Resource Ecology and Measurements	X			5
<b>Total Credits</b>					<b>5</b>
<i>Junior</i>					
<b>Semester 6</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BSPM 308	Ecology and Management of Weeds	X			3
F 311	Forest Ecology	X			3
NR 319	Introduction to Geospatial Science	X			4
RS 313/F 313	Dendrology and Herbaceous Plant ID				3
Elective			X		3
<b>Total Credits</b>					<b>16</b>
<b>Semester 7</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
GR 204/WR 204	Sustainable Watersheds (GT-SC2)	X		3A	3
NR 320	Natural Resources History and Policy	X			3
RS 378	Disturbance Ecology	X			2
Select one course from the following:		X			3-4
BZ 440	Plant Physiology				
HORT 260	Plant Propagation				
HORT 321	Nursery Production and Management				
Select one course from the following:		X			3
CO 300	Writing Arguments (GT-CO3)			2	
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)			2	
JTC 300	Strategic Writing and Communication (GT-CO3)			2	
<b>Total Credits</b>					<b>14-15</b>
<i>Senior</i>					
<b>Semester 9</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
NR 477	Restoration Case Studies Field Tour	X		4C	1
NR 479	Restoration Case Studies	X		4C	2
RS 432	Rangeland Measurements and Monitoring	X			2
Select one course from the following:		X			1-4
SOCR 341	Microbiology for Sustainable Agriculture				
SOCR 350	Soil Fertility Management				
SOCR 440	Pedology				
SOCR 442	Forest and Range Soils				
SOCR 455	Microbiomes of Soil Systems				
SOCR 456	Soil Microbiology Laboratory				
SOCR 467	Soil and Environmental Chemistry				
SOCR 470	Soil Physics				
SOCR 471	Soil Physics Laboratory				
Select one course from the following:		X			3-4
BZ 450	Plant Ecology				
BZ 471	Stream Biology and Ecology				
Electives		X			0-4
<b>Total Credits</b>					<b>13</b>

<b>Semester 10</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
RS 478	Ecological Restoration	X		4A,4B	3
Select one course from the following:		X			3
F 324	Fire Effects and Adaptations				
F 325	Silviculture				
F 326	Wildland Fire Behavior and Management				
F 425	Advanced Wildland Fire Behavior and Management				
Electives		X			7-8
The benchmark courses for the 10th semester are the remaining courses in the entire program of study.		X			
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<b>Total Credits</b>					<b>13-14</b>
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<b>Program Total Credits:</b>					<b>120</b>