# PH.D. IN ECOSYSTEM SUSTAINABILITY

## Requirements Effective Fall 2023

| Code | Title | Credits |
|---|---|---|
| **Required Core Courses:** | | |
| ESS 501 | Principles of Ecosystem Sustainability | 3 |
| ESS 692 | Seminar | 1 |
| **Areas – Select a minimum of 20 credits from the four Areas indicated below:** | | **20** |
| **Ecosystem Science** | | |
| At least one course must be selected from the following (2-3 credits): | | |
| ESS 524 | Foundations for Carbon/Greenhouse Gas Mgmt | |
| ESS 543/ATS 543 | Global Climate Change | |
| ESS 625/F 625 | Ecology of Forest Production | |
| ESS 660 | Biogeochemical Cycling in Ecosystems | |
| Additional courses may be selected from the following: | | |
| ATS 753 | Global Hydrologic Cycle | |
| ATS 760 | Global Carbon Cycle | |
| BZ 572 | Phytoremediation | |
| BZ 642 | Plant Metabolism | |
| ECOL 505 | Foundations of Ecology | |
| ECOL 600 | Community Ecology | |
| ECOL 620 | Applications in Landscape Ecology | |
| F 510 | Ecophysiology of Trees | |
| F 624 | Fire Ecology | |
| FW 555 | Conservation Biology | |
| HORT 571 | Soil-Plant-Water Relations/Water Stress | |
| RS 531 | World Grassland Ecogeography | |
| RS 630 | Ecology of Grasslands and Shrublands | |
| SOCR 522 | Micrometeorology | |
| SOCR 540 | Soil-Plant-Nutrient Relationships | |
| WR 574 | Advanced Snow Hydrology | |
| WR 616 | Hillslope Hydrology and Runoff Processes | |
| **Ecosystem Sustainability** | | |
| The following course must be taken (2 credits): | | |
| ESS 542 | Greenhouse Gas Policies | |
| Additional courses may be selected from the following: | | |
| AGRI 500 | Advanced Issues in Agriculture | |
| AGRI 521 | Emerging Issues and Challenges for Global Agr | |
| AGRI 602 | Bioenergy Policy, Economics, and Assessment | |
| AGRI 632 | Managing for Ecosystem Sustainability | |
| AGRI 635 | Integrated Forage Management | |
| AGRI 637 | Understanding Policy and Emerging Issues | |
| AGRI 638 | Ecosystem Services on Agricultural Lands | |
| ANTH 529 | Anthropology and Sustainable Development | |
| ANTH 530 | Human-Environment Interactions | |
| ANEQ 548 | Issues in Manure Management | |
| AREC 542 | Applied Advanced Water Resource Economics | |
| AREC 566/ SOC 566 | Contemporary Issues in Developing Countries | |
| ECOL 592 | Interdisciplinary Seminar in Ecology | |
| GES 542 | Biobased Fuels, Energy, and Chemicals | |
| NR 515 | Natural Resources Policy and Biodiversity | |
| NR 535 | Action for Sustainable Behavior | |
| NR 550 | Sustainable Military Lands Management | |
| PHIL 565 | Seminar in Environmental Philosophy | |
| POLS 670 | Politics of Environment and Sustainability | |
| POLS 709 | Environmental Politics in the U.S. | |
| POLS 729 | Political Theory and the Environment | |
| POLS 739 | International Environmental Politics | |
| POLS 749 | Comparative Environmental Politics | |
| POLS 759 | Environmental Policy and Administration | |
| RS 565 | Riparian Ecology and Management | |
| SOC 564 | Environmental Justice | |
| SOC 666 | Globalization and Socioeconomic Restructuring | |
| SOC 668 | Environmental Sociology | |
| SOC 669 | Global Inequality and Change | |
| WR 510 | Watershed Management in Developing Countries | |
| **Quantitative Methods** | | |
| At least one course must be selected from the following (4 credits): | | |
| ESS 545 | Applications in Greenhouse Gas Inventories | |
| ESS 565 | Niche Models | |
| ESS 575 | Models for Ecological Data | |
| Additional courses may be selected from the following: | | |
| ANTH 554/ ESS 554 | Ecological and Social Agent-based Modeling | |
| AREC 535/ ECON 535 | Applied Econometrics | |
| AREC 540/ ECON 540 | Environmental and Natural Resource Economics | |
| ECOL 620 | Applications in Landscape Ecology | |
| F 521 | Advanced Quantitative Methods in Forestry II | |
| GEOL 551 | Groundwater Modeling | |
| LAND 520 | Geographic Information Systems | |
| NR 503/GR 503 | Remote Sensing and Image Analysis | |
| NR 505 | Concepts in GIS | |
| NR 512 | Spatial Statistical Modeling-Natural Resources | |
| NR 523/STAT 523 | Quantitative Spatial Analysis | |
| NR 565 | Principles of Natural Resources Ecology | |
| RS 532 | Rangeland Ecosystem Sampling | |
| SOCR 620 | Modeling Ecosystem Biogeochemistry | |

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| SOCR 670 | Terrestrial Ecosystems Isotope Ecology | |
| STAA 551 | Regression Models and Applications | |
| STAA 552 | Generalized Regression Models | |
| STAA 553 | Experimental Design | |
| STAA 554 | Mixed Models | |
| STAA 561 | Probability with Applications | |
| STAA 562 | Mathematical Statistics with Applications | |
| STAA 565 | Quantitative Reasoning | |
| STAA 566 | Data Visualization Methods | |
| STAA 567 | Computational and Simulation Methods | |
| STAA 571 | Survey Statistics | |
| STAA 572 | Nonparametric Methods | |
| STAA 573 | Analysis of Time Series | |
| STAA 574 | Methods in Multivariate Analysis | |
| STAA 575 | Applied Bayesian Statistics | |
| STAA 576 | Methods in Spatial Statistics | |
| STAR 511 | Design and Data Analysis for Researchers I | |
| STAR 512 | Design and Data Analysis for Researchers II | |
| STAT 521 | Stochastic Processes I | |
| STAT 525 | Analysis of Time Series I | |
| STAT 540 | Data Analysis and Regression | |
| STAT 544/ ERHS 544 | Biostatistical Methods for Quantitative Data | |
| STAT 547/ CIVE 547 | Statistics for Environmental Monitoring | |
| STAT 560 | Applied Multivariate Analysis | |
| STAT 570 | Nonparametric Statistics | |
| STAT 600 | Statistical Computing | |
| STAT 605 | Theory of Sampling Techniques | |
| STAT 640 | Design and Linear Modeling I | |
| STAT 645 | Categorical Data Analysis and GLIM | |
| STAT 650 | Design and Linear Modeling II | |
| WR 524/CIVE 524 | Modeling Watershed Hydrology | |
| WR 575 | Snow Hydrology Field Methods | |
| WR 674 | Data Issues in Hydrology | |
| **Communication/Collaboration** | | |
| At least one course must be selected from the following (1-3 credits): | | |
| ECOL 693 | Research Seminar | |
| JTC 614 | Public Communication Campaigns | |
| JTC 660 | Communication and Innovation | |
| JTC 661 | Information Design | |
| JTC 662 | Communicating Science and Technology | |
| NR 501 | Leadership and Public Communications | |
| **Research and Dissertation (minimum credits required):** | | |
| ESS 798 | Research | 3 |
| ESS 799 | Dissertation | 3 |
| **Additional credits required to complete this degree may include:** | | **42** |
| Master's Degree Credit (a maximum of 30 credits may be accepted from a master's degree) | | |
| Additional courses not taken previously from the Areas listed above | | |
| Additional credits completed under ESS 798 or ESS 799 beyond the minimum credits required above | | |
| **Program Total Credits:** | | **72** |

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