

# GEOGRAPHY (GEOG)

## **GEOG 100. \*CLIMATE JUSTICE. (3 Credits)**

Unequal distribution of social, economic and political power that creates winners and losers from climate change. Case studies of climate-change-related environmental degradation, conflict, conservation, climate denial, renewable energy, and investment. Concepts and actions to promote climate justice. Lec/rec. (Bacc Core Course)

**Attributes:** CPDP – Core, Perspective, Difference/Power/Discrimination

## **GEOG 102. \*PHYSICAL GEOGRAPHY. (4 Credits)**

Processes that shape the earth's surface. Weathering, mass movement, landforms, river systems, groundwater, biogeography, human effects on the landscape. Use of maps and imagery. (Bacc Core Course)

**Attributes:** CPPS – Core, Pers, Physical Science

**Equivalent to:** GEO 102

## **GEOG 103. \*HUMAN GEOGRAPHY. (3 Credits)**

Introduction to how human activity affects or is influenced by the earth's surface, including languages, religions, migration, development, and resources. (Bacc Core Course)

**Attributes:** CPSI – Core, Pers, Soc Proc & Inst

## **GEOG 105. \*GEOGRAPHY OF THE NON-WESTERN WORLD. (3 Credits)**

An introduction to the rich variety of environments, population and settlement dynamics, cultures, geopolitical changes, and economies in Africa, the Middle East, and Asia. Lec/lab/rec. (Bacc Core Course) Equivalent course is GEO 105.

**Attributes:** CPCD – Core, Pers, Cult Diversity

**Equivalent to:** GEO 105

## **GEOG 106. \*GEOGRAPHY OF THE WESTERN WORLD. (3 Credits)**

An introduction to the rich variety of environments, population and settlement dynamics, cultures, geopolitical changes, and economics in Europe and Russia, Australia and Oceania, and the Americas. Lec/rec. (SS) (Bacc Core Course) Equivalent course is GEO 106.

**Attributes:** CPWC – Core, Pers, West Culture; LACS – Liberal Arts Social Core

**Equivalent to:** GEO 106

## **GEOG 199. SPECIAL STUDIES. (1-16 Credits)**

*This course is repeatable for 16 credits.*

## **GEOG 201. \*FOUNDATIONS OF GEOSPATIAL SCIENCE AND GIS. (4 Credits)**

Basic physical science principles underlying geospatial technologies such as GPS, mobile devices, and online mapping and navigation tools used in GIS, remote sensing, and geovisualization. Concepts and applications in government, business, and the environment. (Bacc Core Course) Equivalent course is GEO 301.

**Attributes:** CPPS – Core, Pers, Physical Science

**Equivalent to:** GEO 301

## **GEOG 203. \*HUMAN-ENVIRONMENT GEOGRAPHY. (3 Credits)**

How human societies manage resources, physical limits to sustainability, role of science in the use and management of resources, and how societal resource use adversely affects other societies, in human history and across spatial scales. Lec/rec. (Bacc Core Course)

**Attributes:** CPDP – Core, Perspective, Difference/Power/Discrimination

## **GEOG 240. \*CLIMATE CHANGE, WATER AND SOCIETY. (3 Credits)**

Introduction to social, ecological and economic impacts of climate change induced water problems in various geographic regions and cultures. Approaches to climate change mitigation and adaptation in various parts of the world. (Bacc Core Course) Equivalent course is GEO 204.

**Attributes:** CPSI – Core, Pers, Soc Proc & Inst

**Equivalent to:** GEO 204

## **GEOG 250. \*LAND USE PLANNING FOR SUSTAINABLE COMMUNITIES. (3 Credits)**

Overview of the history and current practices of land use and community planning. Use basic geospatial tools to assess land use patterns and planning processes. (Bacc Core Course)

**Attributes:** CPSI – Core, Pers, Soc Proc & Inst

## **GEOG 251. \*GEOGRAPHY OF DISASTER MANAGEMENT. (3 Credits)**

Introduction to the geographic concepts and processes for effective disaster management, including response, recovery, mitigation and preparedness. Risk assessment and evidence-based best practices to prepare and respond to emergencies in a variety of geographic contexts. (Bacc Core Course) Equivalent course is GEO 205.

**Attributes:** CPSI – Core, Pers, Soc Proc & Inst

**Equivalent to:** GEO 205

## **GEOG 295. INTRODUCTION TO GEOGRAPHIC FIELD RESEARCH. (3 Credits)**

Two-week course taught in the fall program in various locations throughout the west. Collect and analyze data associated with both human and physical geography. Field trip required, transportation fee charged. Lec/lab. Equivalent course is GEO 296.

**Equivalent to:** GEO 296

## **GEOG 299. SPECIAL STUDIES. (1-16 Credits)**

*This course is repeatable for 16 credits.*

## **GEOG 300. \*SUSTAINABILITY FOR THE COMMON GOOD. (3 Credits)**

Geography of human relationships to the earth's systems with an emphasis on individual impacts and collective efforts to achieve environmental sustainability. Lec/rec. (SS) (Bacc Core Course)

**Attributes:** CSGI – Core, Synth, Global Issues; CSST – Core, Synthesis, Science/Technology/Society; LACS – Liberal Arts Social Core

**Equivalent to:** GEO 300, GEOG 300H

## **GEOG 300H. \*SUSTAINABILITY FOR THE COMMON GOOD. (3 Credits)**

Geography of human relationships to the earth's systems with an emphasis on individual impacts and collective efforts to achieve environmental sustainability. (Bacc Core Course)

**Attributes:** CSGI – Core, Synth, Global Issues; CSST – Core, Synthesis, Science/Technology/Society; HNRS – Honors Course Designator; LACS – Liberal Arts Social Core

**Equivalent to:** GEOG 300

## **GEOG 311. \*GEOGRAPHY OF AFRICA. (3 Credits)**

An introduction to the physical, historical, cultural, political, and development geography of Africa south of the Sahara. (NC) (Bacc Core Course) Equivalent course is GEO 325.

**Attributes:** CPCD – Core, Pers, Cult Diversity; LACN – Liberal Arts Non-Western Core

**Equivalent to:** GEO 325

**GEOG 313. \*GEOGRAPHY OF ASIA. (3 Credits)**

Geographic analysis of Asia's lands and peoples. Emphasis on regional physical environments, resources and development potentials, population trends, and international importance to the United States. Offered once every other year. (NC) (Bacc Core Course) Equivalent course is GEO 327.

**Attributes:** CPCD – Core, Pers, Cult Diversity; LACN – Liberal Arts Non-Western Core

**Equivalent to:** GEO 327

**GEOG 314. \*GEOGRAPHY OF LATIN AMERICA. (3 Credits)**

Focuses on the diverse landscapes, peoples and cultural traditions of Latin America, a vast region extending from the United States-Mexican border to the southern tip of South America. (NC) (Bacc Core Course)

**Attributes:** CPCD – Core, Pers, Cult Diversity; LACN – Liberal Arts Non-Western Core

**Equivalent to:** GEO 328

**GEOG 323. ^CLIMATOLOGY. (4 Credits)**

Systematic analysis of global and regional climates. Physical principles of climate, climate classifications, and distribution and characteristics of climate regimes. Lec/lab. (Writing Intensive Course)

**Attributes:** CWIC – Core, Skills, WIC

**Prerequisites:** GEOG 102 with D- or better or GEO 202 with D- or better or GEO 102 with D- or better

**Equivalent to:** GEO 323

**GEOG 324. ^ECOLOGICAL BIOGEOGRAPHY. (4 Credits)**

Spatial distributions and change over time of species, communities, and biomes. Effect of climate, tectonics, disturbance on evolution, extinction, and succession. Implications for conservation. (Writing Intensive Course)

**Attributes:** CWIC – Core, Skills, WIC

**Prerequisites:** GEOG 102 with D- or better or (BI 370 with C- or better or BI 370H with C- or better)

**Equivalent to:** GEO 324

**GEOG 330. \*^GEOGRAPHY OF INTERNATIONAL DEVELOPMENT AND GLOBALIZATION. (3 Credits)**

Introduction to the geography of global wealth and inequality with a focus on contemporary development, underdevelopment, and globalization problems in Asian, African, Caribbean, Latin American, and Pacific Island countries. (Bacc Core Course) (Writing Intensive Course) Equivalent course is GEO 330.

**Attributes:** CSGI – Core, Synth, Global Issues; CWIC – Core, Skills, WIC

**Prerequisites:** GEOG 105 with D- or better or GEOG 106 with D- or better or GEO 105 with D- or better or GEO 106 with D- or better

**Equivalent to:** GEO 330

**GEOG 331. \*POPULATION, CONSUMPTION, AND ENVIRONMENT. (3 Credits)**

An examination of population patterns and trends, emphasizing historical growth and more recent demographic changes; using geographic tools to understand patterns of spatial distribution, to use and analyze data sources, and to gain experience interpreting and displaying data about population structure and dynamics; and developing the ability to evaluate the relationship between population, consumption, resources, and quality of life. Patterns of consumption, as individuals and societies will be examined and different future scenarios will be examined with reference to environmental, social and economic sustainability. (Bacc Core Course) Equivalent course is GEO 350.

**Attributes:** CSGI – Core, Synth, Global Issues

**Equivalent to:** GEO 350

**GEOG 340. \*INTRODUCTION TO WATER SCIENCE AND POLICY. (3 Credits)**

Policy and science of the hydrologic cycle. Emphasis on interaction between water's natural time-space fluctuations and human uses. (Bacc Core Course) Equivalent course is GEO 335 and SOIL 335.

**Attributes:** CSST – Core, Synthesis, Science/Technology/Society

**Equivalent to:** CSS 335, CSS 335H, GEO 335, GEO 335H, GEOG 340H, SOIL 335

**GEOG 340H. \*INTRODUCTION TO WATER SCIENCE AND POLICY. (3 Credits)**

Policy and science of the hydrologic cycle. Emphasis on interaction between water's natural time-space fluctuations and human uses. (Bacc Core Course)

**Attributes:** CSST – Core, Synthesis, Science/Technology/Society; HNRS – Honors Course Designator

**Equivalent to:** CSS 335, CSS 335H, GEO 335, GEO 335H, GEOG 340, SOIL 335

**GEOG 350. \*GEOGRAPHY OF NATURAL HAZARDS. (3 Credits)**

Introduction to the geography of risk, natural hazards, and disasters, focusing on concepts of vulnerability, adaptation and resilience of human society in the Pacific Northwest and globally. Equivalent course is GEO 304.

**Attributes:** CSGI – Core, Synth, Global Issues

**Equivalent to:** GEO 304

**GEOG 360. GISCIENCE I: GEOGRAPHIC INFORMATION SYSTEMS AND THEORY. (4 Credits)**

Fundamentals of spatial data, geographic information systems (GIS), and introductory spatial analysis, programming, and modeling. Equivalent course is GEO 365 and GEO 465.

**Equivalent to:** GEO 365

**GEOG 361. GISCIENCE II: ANALYSIS AND APPLICATIONS. (4 Credits)**

Applications-based course. Development and conduct of geospatial analyses using various spatial data structures, techniques and models. Students acquire, clean, integrate, manipulate, visualize and analyze geospatial data through laboratory work. Lec/lab. Equivalent course is GEO 480.

**Prerequisites:** GEOG 360 with C- or better and MTH 112 [C-] and (ST 201 [C-] or ST 351 [C-])

**Equivalent to:** GEO 480

**GEOG 370. GEOVISUALIZATION: CARTOGRAPHY. (4 Credits)**

Basic cartographic principles. Design, compilation, and construction of maps. Equivalent course is GEO 360.

**Prerequisites:** GEOG 201 with D- or better or GEO 301 with D- or better

**Equivalent to:** GEO 360

**GEOG 371. GEOVISUALIZATION: WEB MAPPING. (4 Credits)**

Current developments in Internet mapping and advanced cartographic skills applied to web-based maps. Techniques of Internet mapping and principles of web-based cartography, including multimedia, animation, 3D visualization, and user interface design. Lec/lab.

**Prerequisites:** GEOG 201 with D- or better or GEO 301 with D- or better

**GEOG 399. SPECIAL STUDIES. (1-16 Credits)**

**Equivalent to:** GEOG 399H

*This course is repeatable for 16 credits.*

**GEOG 399H. SPECIAL STUDIES. (1-16 Credits)**

**Attributes:** HNRS – Honors Course Designator

**Equivalent to:** GEOG 399

*This course is repeatable for 16 credits.*

**GEOG 400. FIELD TRIPS. (1-16 Credits)**

Participation in group field trips that are not a part of any other course. Transportation fee is charged. Students may prepare guides for trips. Faculty sponsor must be prearranged.  
*This course is repeatable for 48 credits.*

**GEOG 401. RESEARCH. (1-16 Credits)**

Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged.  
*This course is repeatable for 24 credits.*

**GEOG 403. THESIS. (1-16 Credits)**

Independent, original study that culminates in a senior thesis. Faculty sponsor must be prearranged.  
*This course is repeatable for 24 credits.*

**GEOG 405. READING AND CONFERENCE. (1-16 Credits)**

Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged.  
*This course is repeatable for 16 credits.*

**GEOG 407. SEMINAR. (1-16 Credits)**

Graded P/N.  
*This course is repeatable for 16 credits.*

**GEOG 408. WORKSHOP. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**GEOG 410. INTERNSHIP. (1-16 Credits)**

Pre-career professional experience under joint faculty and employer supervision. Graded P/N.  
*This course is repeatable for 16 credits.*

**Recommended:** 12 credits of upper-division geography

**GEOG 423. SNOW HYDROLOGY. (3 Credits)**

Fundamentals of snow hydrology. Physical principles of snow formation, snowpack accumulation, energy balance, snowcover-climate interactions, snow metamorphism, snowpack ablation, snowpack/snowmelt chemistry, remote sensing of snow, avalanches, field methods, snowmelt/runoff modeling techniques, and watershed processes. Equivalent course is GEO 483.

**Equivalent to:** GEO 483

**GEOG 424. HYDROLOGY FOR WATER RESOURCES MANAGEMENT. (3 Credits)**

A quantitative introduction to surface and subsurface hydrology with a focus on decision making for the water resource professional.

**Prerequisites:** MTH 251 with C- or better

**GEOG 430. RESILIENCE-BASED NATURAL RESOURCE MANAGEMENT. (3 Credits)**

Causes and consequences of conflict over natural resource management at local to global scales; principles for managing social-ecological systems for resilience. Field trip(s) may be required; transportation fee charged. Equivalent course is GEO 420.

**Equivalent to:** GEO 420

**GEOG 431. GLOBAL RESOURCES AND DEVELOPMENT. (3 Credits)**

Examines resource development issues and strategies in the Global South. Issues and strategies from agriculture, forestry, fisheries, energy, wildlife management, mineral development, land use, and health are examined. Equivalent course is GEO 426.

**Equivalent to:** GEO 426

**GEOG 432. \*GEOGRAPHY OF FOOD AND AGRICULTURE. (3 Credits)**

Overview of food and agriculture in relation to production and consumption regions as a basis for distinguishing different types of food and agricultural systems. Local and global examination of the geographic aspects of breeding, location in agricultural systems, and adaptation in agro-ecosystems using field study, explorations of literature, and lecture. Field trip required, transportation fee charged. (Bacc Core Course) Equivalent course is GEO 449.

**Attributes:** CSST – Core, Synthesis, Science/Technology/Society

**Equivalent to:** GEO 449

**GEOG 440. WATER RESOURCES MANAGEMENT IN THE UNITED STATES. (3 Credits)**

An investigation of the various approaches to water resources geography within the U.S. Explores the disciplines that address water resources management, their tools, and their limitations. Topics include engineering, law, economics, risk assessment, game theory, conflict resolution, and the fine arts. Equivalent course is GEO 425.

**Equivalent to:** GEO 425

**Recommended:** 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

**GEOG 441. INTERNATIONAL WATER RESOURCES MANAGEMENT. (3 Credits)**

An investigation of the various approaches to water resources geography at the international level. Explores the interaction between water science and policy through issues of current "hydropolitics" and water resources development. Topics include water quality, dams and development, conflict and cooperation, climate change, and water institutions. Equivalent course is GEO 424.

**Equivalent to:** GEO 424

**Recommended:** 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

**GEOG 450. LAND USE IN THE AMERICAN WEST. (3 Credits)**

Development of a conceptual framework for land use study; analysis of land as a resource, land use trends, land use principles, and management issues as related to planning, focusing on the American West, the fastest growing region in the nation. Equivalent course is GEO 423.

**Equivalent to:** GEO 423

**GEOG 451. PLANNING PRINCIPLES AND PRACTICES FOR RESILIENT COMMUNITIES. (4 Credits)**

Applies GIS skills and techniques to determine and analyze future land uses. Determine suitable land uses that incorporate community goals, site constraints and minimize use conflicts. Regulatory and market-based implementation strategies for land uses will also be discussed. Lec/lab.

Equivalent course is GEO 452.

**Prerequisites:** GEOG 360 with C- or better or GEOG 560 with C- or better or GEO 365 with C- or better or GEO 465 with C- or better

**Equivalent to:** GEO 452

**GEOG 452. SUSTAINABLE SITE PLANNING. (3 Credits)**

Use of geographic concepts and techniques in site planning to create sustainable management reports for local sites. Inventory of environmental characteristics and human uses, conceptual design for future uses of the site, principles of green infrastructure and sustainable building practices. Local field trip required, transportation fee charged.

Equivalent course is GEO 451.

**Equivalent to:** GEO 451

**Recommended:** GEOG 250

**GEOG 462. GISCIENCE III: PROGRAMMING FOR GEOSPATIAL ANALYSIS. (4 Credits)**

Introduction to the extension of geographic information systems (GIS) through programming. No prior programming experience is expected. Teaches a pragmatic approach to design and write programs for geospatial analysis. Equivalent course is GEO 578.

**Prerequisites:** GEOG 361 with C- or better or GEOG 561 with C- or better or GEO 480 with C- or better

**Equivalent to:** GEO 578

**GEOG 463. GISCIENCE IV: SPATIAL MODELING. (4 Credits)**

Introduction to spatial simulation models representing attraction, segregation, individual entities, and processes of spread, applied to contemporary problems in human and physical geography.

**Prerequisites:** GEOG 462 with C- or better or GEOG 562 with C- or better or GEO 578 with C- or better

**GEOG 464. GEOSPATIAL PERSPECTIVES ON INTELLIGENCE, SECURITY, AND ETHICS. (3 Credits)**

Applications and implications of geospatial science (GIS, remote sensing, and spatial analysis) in intelligence, human, environmental, and ethical domains. Concepts and practices of ethics in geospatial science, including data access, management, visualization, and decision-making. Equivalent course is GEO 567.

**Prerequisites:** GEOG 360 with C- or better or GEOG 560 with C- or better or GEO 365 with C- or better or GEO 465 with C- or better

**Equivalent to:** GEO 567

**Recommended:** Senior standing

**GEOG 472. GEOVISUALIZATION: GEOVISUAL ANALYTICS. (3 Credits)**

Concepts and techniques underlying the production of maps by computer. Practical experience with a variety of computer mapping packages. Lec/lab. Equivalent course is GEO 445.

**Prerequisites:** GEOG 370 with C- or better or GEOG 371 with C- or better or GEO 360 with C- or better

**Equivalent to:** GEO 445

**GEOG 480. REMOTE SENSING I: PRINCIPLES AND APPLICATIONS. (4 Credits)**

Fundamentals of satellite remote sensing and image analysis. Topics include physical principles of remote sensing from the ultraviolet to the microwave, sensors and sensor technology, and environmental applications of remote sensing through image analysis. Lec/lab. Equivalent course is GEO 444.

**Prerequisites:** GEOG 201 with C- or better or GEO 301 with C- or better

**Equivalent to:** GEO 444

**GEOG 481. REMOTE SENSING II: DIGITAL IMAGE PROCESSING. (4 Credits)**

Digital analysis of remote sensor data. Image display enhancement, classification, and rectification principles. Practical experience with an image processing system. Equivalent course is GEO 466.

**Prerequisites:** (GEOG 480 with C- or better or GEOG 580 with C- or better or GEO 444 with C- or better or GEO 544 with C- or better) and (ST 202 [D-] or ST 352 [D-])

**Equivalent to:** GEO 466

**GEOG 495. FIELD GEOGRAPHY OF OREGON I. (3 Credits)**

Designed as a capstone experience. Challenges students to assess the origins of the physical features of a landscape, and evaluate the impacts of features on the area's human geography, and vice versa. Three weekend field trips required, transportation fee charged. Equivalent course is GEO 435.

**Prerequisites:** GEOG 295 with C- or better or GEO 295 with C- or better

**Equivalent to:** GEO 435

**Recommended:** Junior or senior standing

**GEOG 499. SPECIAL STUDIES. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**GEOG 500. FIELD TRIPS. (1-16 Credits)**

Participation in group field trips that are not a part of any other course. Transportation fee charged. Students may prepare guides for trips. Faculty sponsor must be prearranged.

*This course is repeatable for 48 credits.*

**GEOG 501. RESEARCH. (1-16 Credits)**

Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged.

*This course is repeatable for 24 credits.*

**GEOG 503. THESIS. (1-16 Credits)**

Independent, original study that culminates in a thesis. Faculty sponsor must be prearranged.

*This course is repeatable for 999 credits.*

**GEOG 505. READING AND CONFERENCE. (1-16 Credits)**

Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged.

*This course is repeatable for 16 credits.*

**GEOG 507. SEMINAR. (1-16 Credits)**

Graded P/N.

*This course is repeatable for 16 credits.*

**GEOG 508. WORKSHOP. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**GEOG 510. INTERNSHIP. (1-15 Credits)**

Pre-career professional experience under joint faculty and employer supervision. Graded P/N.

*This course is repeatable for 16 credits.*

**GEOG 511. HISTORY AND PHILOSOPHY OF GEOGRAPHY. (3 Credits)**

The historical development of research traditions in the discipline of geography. This includes an examination of changes in conceptual structures and current trends. Equivalent course is GEO 515.

**Equivalent to:** GEO 515

**GEOG 512. SOCIAL-ECOLOGICAL SYSTEMS. (3 Credits)**

Exploration of critical debates surrounding theories associated with social-ecological systems, resilience, vulnerability, adaptation, social learning, transformation, adaptive governance. Equivalent course is GEO 554.

**Equivalent to:** GEO 554

**Recommended:** 9 credits of graduate study.

**GEOG 523. SNOW HYDROLOGY. (3 Credits)**

Fundamentals of snow hydrology. Physical principles of snow formation, snowpack accumulation, energy balance, snowcover-climate interactions, snow metamorphism, snowpack ablation, snowpack/snowmelt chemistry, remote sensing of snow, avalanches, field methods, snowmelt/runoff modeling techniques, and watershed processes. Equivalent course is GEO 583.

**Equivalent to:** GEO 583

**GEOG 524. HYDROLOGY FOR WATER RESOURCES MANAGEMENT. (3 Credits)**

A quantitative introduction to surface and subsurface hydrology with a focus on decision making for the water resource professional.

**Recommended:** MTH 251

**GEOG 530. RESILIENCE-BASED NATURAL RESOURCE MANAGEMENT. (3 Credits)**

Causes and consequences of conflict over natural resource management at local to global scales; principles for managing social-ecological systems for resilience. Field trip(s) may be required; transportation fee charged. Equivalent course is GEO 520.

**Equivalent to:** GEO 520

**GEOG 531. GLOBAL RESOURCES AND DEVELOPMENT. (3 Credits)**

Examines resource development issues and strategies in the Global South. Issues and strategies from agriculture, forestry, fisheries, energy, wildlife management, mineral development, land use, and health are examined. Equivalent course is GEO 526.

**Equivalent to:** GEO 526

**GEOG 532. GEOGRAPHY OF FOOD AND AGRICULTURE. (3 Credits)**

Overview of food and agriculture in relation to production and consumption regions as a basis for distinguishing different types of food and agricultural systems. Local and global examination of the geographic aspects of breeding, location in agricultural systems, and adaptation in agro-ecosystems using field study, explorations of literature, and lecture. Field trip required, transportation fee charged. Equivalent course is GEO 549.

**Equivalent to:** GEO 549

**GEOG 540. WATER RESOURCES MANAGEMENT IN THE UNITED STATES. (3 Credits)**

An investigation of the various approaches to water resources geography within the U.S. Explores the disciplines that address water resources management, their tools, and their limitations. Topics include engineering, law, economics, risk assessment, game theory, conflict resolution, and the fine arts. Equivalent course is GEO 525.

**Equivalent to:** GEO 525

**Recommended:** 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

**GEOG 541. INTERNATIONAL WATER RESOURCES MANAGEMENT. (3 Credits)**

An investigation of the various approaches to water resources geography at the international level. Explores the interaction between water science and policy through issues of current "hydropolitics" and water resources development. Topics include water quality, dams and development, conflict and cooperation, climate change, and water institutions. Equivalent course is GEO 524.

**Equivalent to:** GEO 524

**Recommended:** 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

**GEOG 546. ADVANCED LANDSCAPE AND SEASCAPE ECOLOGY. (4 Credits)**

Pattern-process interactions in large scale ecological and physical systems, including terrestrial, aquatic, and marine/ocean ecosystems. Principles of pattern-process interactions from genetic to community levels of ecological organization applied to design of conservation reserves. Hypothesis testing, field techniques, spatial models/statistics, GIS/remote sensing. Lec/lab. Equivalent course is GEO 546.

**Equivalent to:** GEO 546

**GEOG 550. LAND USE IN THE AMERICAN WEST. (3 Credits)**

Development of a conceptual framework for land use study; analysis of land as a resource, land use trends, land use principles, and management issues as related to planning, focusing on the American West, the fastest growing region in the nation. Equivalent course is GEO 523.

**Equivalent to:** GEO 523

**GEOG 551. PLANNING PRINCIPLES AND PRACTICES FOR RESILIENT COMMUNITIES. (4 Credits)**

Applies GIS skills and techniques to determine and analyze future land uses. Determine suitable land uses that incorporate community goals, site constraints and minimize use conflicts. Regulatory and market-based implementation strategies for land uses will also be discussed. Lec/lab. Equivalent course is GEO 552.

**Prerequisites:** GEOG 360 with C or better or GEOG 560 with C or better

**Equivalent to:** GEO 552

**GEOG 552. SUSTAINABLE SITE PLANNING. (3 Credits)**

Use of geographic concepts and techniques in site planning to create sustainable management reports for local sites. Inventory of environmental characteristics and human uses, conceptual design for future uses of the site, principles of green infrastructure and sustainable building practices. Local field trip required, transportation fee charged. Equivalent course is GEO 551.

**Equivalent to:** GEO 551

**Recommended:** GEOG 250

**GEOG 560. GISCIENCE I: INTRODUCTION TO GEOGRAPHIC INFORMATION SCIENCE. (4 Credits)**

Introduction to modern spatial data processing, development, and functions of geographic information systems (GIS); theory, concepts and applications of geographic information science (GIScience). Equivalent course is GEO 565.

**Equivalent to:** GEO 565

**GEOG 561. GISCIENCE II: ANALYSIS AND APPLICATIONS. (4 Credits)**

Applications-based course. Development and conduct of geospatial analyses using various spatial data structures, techniques and models. Students acquire, clean, integrate, manipulate, visualize and analyze geospatial data through laboratory work. Lec/lab. Equivalent course is GEO 580.

**Prerequisites:** GEOG 560 with C or better

**Equivalent to:** GEO 580

**GEOG 562. GISCIENCE III: PROGRAMMING FOR GEOSPATIAL ANALYSIS. (4 Credits)**

Introduction to the extension of geographic information systems (GIS) through programming. No prior programming experience is expected. Teaches a pragmatic approach to design and write programs for geospatial analysis. Equivalent course is GEO 578.

**Prerequisites:** GEOG 361 with C or better or GEOG 561 with C or better

**Equivalent to:** GEO 578

**GEOG 563. GISCIENCE IV: SPATIAL MODELING. (4 Credits)**

Introduction to spatial simulation models representing attraction, segregation, individual entities, and processes of spread, applied to contemporary problems in human and physical geography.

**Prerequisites:** GEOG 462 with C or better or GEOG 562 with C or better

**GEOG 564. GEOSPATIAL PERSPECTIVES ON INTELLIGENCE, SECURITY, AND ETHICS. (3 Credits)**

Applications and implications of geospatial science (GIS, remote sensing, and spatial analysis) in intelligence, human, environmental, and ethical domains. Concepts and practices of ethics in geospatial science, including data access, management, visualization, and decision-making. Equivalent course is GEO 567.

**Prerequisites:** GEOG 360 with C or better or GEOG 560 with C or better

**Equivalent to:** GEO 567

**GEOG 565. SPATIO-TEMPORAL VARIATION IN ECOLOGY AND EARTH SCIENCE. (4 Credits)**

Objectives and techniques of spatial and temporal analysis. Point patterns, geostatistics, spectral analysis, wavelet analysis, interpolation, and mapping. Equivalent course is GEO 541.

**Equivalent to:** GEO 541

**GEOG 566. ADVANCED SPATIAL STATISTICS AND GISCIENCE. (4 Credits)**

Provides advanced graduate students from a variety of disciplines in earth science and ecology the opportunity to structure and conduct spatio-temporal analyses using available software tools and their own datasets for their graduate research. Equivalent course is GEO 584.

**Equivalent to:** GEO 584

**GEOG 571. GEOVISUALIZATION: WEB MAPPING. (4 Credits)**

Overview of methods and applications in interactive, dynamic cartographic visualization. Design and construction of customized user interfaces to geographic information. Lec/lab. Equivalent course is GEO 568.

**Equivalent to:** GEO 568

**Recommended:** GEOG 370

**GEOG 572. GEOVISUALIZATION: GEOVISUAL ANALYTICS. (3 Credits)**

Concepts and techniques underlying the production of maps by computer. Practical experience with a variety of computer mapping packages. Lec/lab. Equivalent course is GEO 545.

**Equivalent to:** GEO 545

**Recommended:** GEOG 370 or GEOG 371

**GEOG 580. REMOTE SENSING I: PRINCIPLES AND APPLICATIONS. (4 Credits)**

Fundamentals of satellite remote sensing and image analysis. Topics include physical principles of remote sensing from the ultraviolet to the microwave, sensors and sensor technology, and environmental applications of remote sensing through image analysis. Lec/lab.

Equivalent course is GEO 544.

**Equivalent to:** GEO 544

**Recommended:** GEOG 201 or GEO 301

**GEOG 581. REMOTE SENSING II: DIGITAL IMAGE PROCESSING. (4 Credits)**

Digital analysis of remote sensor data. Image display enhancement, classification, and rectification principles. Practical experience with an image processing system. Equivalent course is GEO 566.

**Prerequisites:** GEOG 580 with C or better

**Equivalent to:** GEO 566

**Recommended:** ST 352 or ST 202

**GEOG 595. FIELD GEOGRAPHY OF OREGON II. (3 Credits)**

Designed to introduce students to the widest possible range of topics on all aspects of Oregon geography within a limited time, then turn that experience into a viable research proposal. While physical processes are the primary topic, resource and environmental effects are stressed. Field trip required, transportation fee charged. Equivalent course is GEO 534.

**Equivalent to:** GEO 534

**GEOG 596. FIELD RESEARCH IN GEOMORPHOLOGY AND LANDSCAPE ECOLOGY. (3 Credits)**

Natural history interpretation of disturbance and recovery processes and management implications in forest-stream landscapes of western Oregon. Course consists of field experience and several seminars.

Transportation and lodging fee charged. Equivalent course is GEO 548.

**Equivalent to:** GEO 548

**Recommended:** 9 graduate credits in sciences or engineering.

**GEOG 599. SPECIAL STUDIES. (1-16 Credits)**

*This course is repeatable for 24 credits.*

**GEOG 600. FIELD TRIPS. (1-16 Credits)**

Participation in group field trips that are not a part of any other course. Transportation fee charged. Students may prepare guides for trips.

Faculty sponsor must be prearranged.

*This course is repeatable for 48 credits.*

**GEOG 601. RESEARCH. (1-16 Credits)**

Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged.

*This course is repeatable for 36 credits.*

**GEOG 603. THESIS. (1-16 Credits)**

Independent, original study that culminates in a thesis. Faculty sponsor must be prearranged.

*This course is repeatable for 999 credits.*

**GEOG 605. READING AND CONFERENCE. (1-16 Credits)**

Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged.

*This course is repeatable for 16 credits.*

**GEOG 607. SEMINAR. (1-16 Credits)**

Graded P/N.

*This course is repeatable for 16 credits.*

**GEOG 608. WORKSHOP. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**GEOG 699. SPECIAL STUDIES. (1-16 Credits)**

*This course is repeatable for 24 credits.*