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Chapter 1 : Physical geography - Wikipedia

Get this from a library! Principles of landscape science and physical-geographic regionalization. [A G Isachenko; John S Massey] -- The gillygoofang, a fish which swims backward to keep the water out of its eyes, is a very bewildering character, even to itself.

Integrated geography Environmental geography is concerned with the description of the spatial interactions between humans and the natural world. It requires an understanding of the traditional aspects of physical and human geography, as well as the ways that human societies conceptualize the environment. Environmental geography has emerged as a bridge between the human and the physical geography, as a result of the increasing specialisation of the two sub-fields. Furthermore, as human relationship with the environment has changed as a result of globalization and technological change, a new approach was needed to understand the changing and dynamic relationship. Examples of areas of research in the environmental geography include: Geomatics Digital Elevation Model DEM Geomatics is concerned with the application of computers to the traditional spatial techniques used in cartography and topography. Geomatics emerged from the quantitative revolution in geography in the mids. Today, geomatics methods include spatial analysis, geographic information systems GIS, remote sensing, and global positioning systems GPS. Geomatics has led to a revitalization of some geography departments, especially in Northern America where the subject had a declining status during the s. Regional geography Main article: Regional geography Regional geography is concerned with the description of the unique characteristics of a particular region such as its natural or human elements. The main aim is to understand, or define the uniqueness, or character of a particular region that consists of natural as well as human elements. Attention is paid also to regionalization, which covers the proper techniques of space delimitation into regions. Related fields Urban planning, regional planning, and spatial planning: Use the science of geography to assist in determining how to develop or not develop the land to meet particular criteria, such as safety, beauty, economic opportunities, the preservation of the built or natural heritage, and so on. The planning of towns, cities, and rural areas may be seen as applied geography. In the s, the regional science movement led by Walter Isard arose to provide a more quantitative and analytical base to geographical questions, in contrast to the descriptive tendencies of traditional geography programs. Regional science comprises the body of knowledge in which the spatial dimension plays a fundamental role, such as regional economics, resource management, location theory, urban and regional planning, transport and communication, human geography, population distribution, landscape ecology, and environmental quality. While the discipline of geography is normally concerned with the Earth, the term can also be informally used to describe the study of other worlds, such as the planets of the Solar System and even beyond. The study of systems larger than the Earth itself usually forms part of Astronomy or Cosmology. The study of other planets is usually called planetary science. Alternative terms such as areology the study of Mars have been proposed but are not widely used. Techniques As spatial interrelationships are key to this synoptic science, maps are a key tool. Classical cartography has been joined by a more modern approach to geographical analysis, computer-based geographic information systems GIS. In their study, geographers use four interrelated approaches: Although other subdisciplines of geography rely on maps for presenting their analyses, the actual making of maps is abstract enough to be regarded separately. Cartography has grown from a collection of drafting techniques into an actual science. Cartographers must learn cognitive psychology and ergonomics to understand which symbols convey information about the Earth most effectively, and behavioural psychology to induce the readers of their maps to act on the information. They must learn geodesy and fairly advanced mathematics to understand how the shape of the Earth affects the distortion of map symbols projected onto a flat surface for viewing. It can be said, without much controversy, that cartography is the seed from which the larger field of geography grew. Most geographers will cite a childhood fascination with maps as an early sign they would end up in the field. Geographic information systems Main article: In

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addition to all of the other subdisciplines of geography, GIS specialists must understand computer science and database systems. GIS has revolutionized the field of cartography: In this context, GIS stands for geographic information science. Remote sensing Main article: Remote sensing Remote sensing is the science of obtaining information about Earth features from measurements made at a distance. Remotely sensed data comes in many forms, such as satellite imagery , aerial photography , and data obtained from hand-held sensors. Remotely sensed data may be analysed either independently of, or in conjunction with other digital data layers e. Quantitative methods Main article: Geostatistics Geostatistics deal with quantitative data analysis, specifically the application of statistical methodology to the exploration of geographic phenomena. Geostatistics is used extensively in a variety of fields, including hydrology , geology , petroleum exploration, weather analysis, urban planning , logistics , and epidemiology. The mathematical basis for geostatistics derives from cluster analysis , linear discriminant analysis and non-parametric statistical tests , and a variety of other subjects. Applications of geostatistics rely heavily on geographic information systems , particularly for the interpolation estimate of unmeasured points. Geographers are making notable contributions to the method of quantitative techniques. Qualitative methods Main article: Ethnography Geographic qualitative methods, or ethnographical research techniques, are used by human geographers. In cultural geography there is a tradition of employing qualitative research techniques, also used in anthropology and sociology. Participant observation and in-depth interviews provide human geographers with qualitative data. History of geography The oldest known world maps date back to ancient Babylon from the 9th century BC. The accompanying text mentions seven outer regions beyond the encircling ocean. The descriptions of five of them have survived. Anaximander is credited with the invention of the gnomon , the simple, yet efficient Greek instrument that allowed the early measurement of latitude. Thales is also credited with the prediction of eclipses. The foundations of geography can be traced to the ancient cultures, such as the ancient, medieval, and early modern Chinese. The Greeks , who were the first to explore geography as both art and science , achieved this through Cartography , Philosophy , and Literature , or through Mathematics. There is some debate about who was the first person to assert that the Earth is spherical in shape, with the credit going either to Parmenides or Pythagoras. Anaxagoras was able to demonstrate that the profile of the Earth was circular by explaining eclipses. However, he still believed that the Earth was a flat disk, as did many of his contemporaries. One of the first estimates of the radius of the Earth was made by Eratosthenes. He employed a sexagesimal system that was derived from Babylonian mathematics. To measure the longitude at different locations on Earth, he suggested using eclipses to determine the relative difference in time. He extended the work of Hipparchus , using a grid system on his maps and adopting a length of Turkish geographer, Mahmud al-Kashgari drew a world map on a linguistic basis, and later so did Piri Reis Piri Reis map. Further, Islamic scholars translated and interpreted the earlier works of the Romans and the Greeks and established the House of Wisdom in Baghdad for this purpose. He often combined astronomical readings and mathematical equations, in order to develop methods of pin-pointing locations by recording degrees of latitude and longitude. He also developed similar techniques when it came to measuring the heights of mountains , depths of the valleys , and expanse of the horizon. He also discussed human geography and the planetary habitability of the Earth. The problem facing both explorers and geographers was finding the latitude and longitude of a geographic location. The problem of latitude was solved long ago but that of longitude remained; agreeing on what zero meridian should be was only part of the problem. It was left to John Harrison to solve it by inventing the chronometer H-4 in , and later in for the International Meridian Conference to adopt by convention the Greenwich meridian as zero meridian. In the West during the 20th century, the discipline of geography went through four major phases: The strong interdisciplinary links between geography and the sciences of geology and botany , as well as economics , sociology and demographics have also grown greatly, especially as a result of earth system science that seeks to understand the world in a holistic view. John Francon Williams - noted author of *The Geography of the Oceans* and other geography works.

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Chapter 2 : 4 Geographic Principles - Mr. Paolano Global Studies

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Physical Geography can be divided into several sub-fields, as follows: Geomorphology is the field concerned with understanding the surface of the Earth and the processes by which it is shaped, both at the present as well as in the past. Geomorphology as a field has several sub-fields that deal with the specific landforms of various environments e. Geomorphology seeks to understand landform history and dynamics, and predict future changes through a combination of field observation, physical experiment, and numerical modeling Geomorphometry. Early studies in geomorphology are the foundation for pedology, one of two main branches of soil science Meander formation. Hydrology is predominantly concerned with the amounts and quality of water moving and accumulating on the land surface and in the soils and rocks near the surface and is typified by the hydrological cycle. Thus the field encompasses water in rivers , lakes , aquifers and to an extent glaciers , in which the field examines the process and dynamics involved in these bodies of water. Hydrology has historically had an important connection with engineering and has thus developed a largely quantitative method in its research; however, it does have an earth science side that embraces the systems approach. Similar to most fields of physical geography it has sub-fields that examine the specific bodies of water or their interaction with other spheres e. Glaciology is the study of glaciers and ice sheets , or more commonly the cryosphere or ice and phenomena that involve ice. Glaciology groups the latter ice sheets as continental glaciers and the former glaciers as alpine glaciers. Although research in the areas are similar with research undertaken into both the dynamics of ice sheets and glaciers, the former tends to be concerned with the interaction of ice sheets with the present climate and the latter with the impact of glaciers on the landscape. Glaciology also has a vast array of sub-fields examining the factors and processes involved in ice sheets and glaciers e. Biogeography is the science which deals with geographic patterns of species distribution and the processes that result in these patterns. Biogeography emerged as a field of study as a result of the work of Alfred Russel Wallace , although the field prior to the late twentieth century had largely been viewed as historic in its outlook and descriptive in its approach. The main stimulus for the field since its founding has been that of evolution , plate tectonics and the theory of island biogeography. The field can largely be divided into five sub-fields: Climatology examines both the nature of micro local and macro global climates and the natural and anthropogenic influences on them. The field is also sub-divided largely into the climates of various regions and the study of specific phenomena or time periods e. Meteorology is the interdisciplinary scientific study of the atmosphere that focuses on weather processes and short term forecasting in contrast with climatology. Studies in the field stretch back millennia, though significant progress in meteorology did not occur until the eighteenth century. Meteorological phenomena are observable weather events which illuminate and are explained by the science of meteorology. Pedology is the study of soils in their natural environment. It is one of two main branches of soil science , the other being edaphology. Pedology mainly deals with pedogenesis , soil morphology , soil classification. In physical geography pedology is largely studied due to the numerous interactions between climate water, air, temperature , soil life micro-organisms, plants, animals , the mineral materials within soils biogeochemical cycles and its position and effects on the landscape such as lateralization. Palaeogeography is a cross-disciplinary study that examines the preserved material in the stratigraphic record to determine the distribution of the continents through geologic time. Almost all the evidence for the positions of the continents comes from geology in the form of fossils or paleomagnetism. The use of this data has resulted in evidence for continental drift , plate tectonics , and supercontinents. This, in turn, has supported palaeogeographic theories such as the Wilson cycle. Coastal geography is the study of the dynamic interface between the ocean and the land, incorporating both the physical geography i. It involves an understanding of coastal weathering processes, particularly wave action, sediment movement and weathering,

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and also the ways in which humans interact with the coast. Coastal geography, although predominantly geomorphological in its research, is not just concerned with coastal landforms, but also the causes and influences of sea level change. It covers a wide range of topics, including marine organisms and ecosystem dynamics biological oceanography ; ocean currents, waves, and geophysical fluid dynamics physical oceanography ; plate tectonics and the geology of the sea floor geological oceanography ; and fluxes of various chemical substances and physical properties within the ocean and across its boundaries chemical oceanography. These diverse topics reflect multiple disciplines that oceanographers blend to further knowledge of the world ocean and understanding of processes within it. Quaternary science is an inter-disciplinary field of study focusing on the Quaternary period, which encompasses the last 2. The field studies the last ice age and the recent interstadial the Holocene and uses proxy evidence to reconstruct the past environments during this period to infer the climatic and environmental changes that have occurred. Landscape ecology is a sub-discipline of ecology and geography that address how spatial variation in the landscape affects ecological processes such as the distribution and flow of energy, materials and individuals in the environment which, in turn, may influence the distribution of landscape "elements" themselves such as hedgerows. The field was largely founded by the German geographer Carl Troll. Landscape ecology typically deals with problems in an applied and holistic context. The main difference between biogeography and landscape ecology is that the latter is concerned with how flows or energy and material are changed and their impacts on the landscape whereas the former is concerned with the spatial patterns of species and chemical cycles. Geomatics is the field of gathering, storing, processing, and delivering geographic information, or spatially referenced information. Geomatics includes geodesy scientific discipline that deals with the measurement and representation of the earth, its gravitational field, and other geodynamic phenomena, such as crustal motion, oceanic tides, and polar motion , geographical information science GIS and remote sensing the short or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing devices that are not in physical or intimate contact with the object. Environmental geography is a branch of geography that analyzes the spatial aspects of interactions between humans and the natural world. The branch bridges the divide between human and physical geography and thus requires an understanding of the dynamics of geology, meteorology, hydrology, biogeography, and geomorphology, as well as the ways in which human societies conceptualize the environment. Although the branch was previously more visible in research than at present with theories such as environmental determinism linking society with the environment. It has largely become the domain of the study of environmental management or anthropogenic influences. Journals and literature[edit] Physical geography and earth science journals communicate and document the results of research carried out in universities and various other research institutions. Most journals cover a specific field and publish the research within that field, however unlike human geographers, physical geographers tend to publish in inter-disciplinary journals rather than predominantly geography journal; the research is normally expressed in the form of a scientific paper. Additionally, textbooks, books, and magazines on geography communicate research to laypeople, although these tend to focus on environmental issues or cultural dilemmas. Examples of journals that publish articles from physical geographers are:

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Chapter 3 : Geography “ Undergraduate Bulletin

Principles of landscape science and physical-geographic regionalization by AnatoliĀ- GrigorĒ'evich Isachenko, , Melbourne University Press edition, in English.

Key concepts Key concepts Key concepts are the big ideas and understandings that we hope will remain with our students long after they have left school. Key concepts Additional concepts The key concepts or big ideas in geography Geographic concepts allow for the exploration of relationships and connections between people and both natural and cultural environments. They have a spatial component. They provide a framework that geographers use to interpret and represent information about the world. The development of understanding of these concepts will allow students to participate as critical, active, informed and responsible citizens. The geography achievement objectives in The New Zealand Curriculum are based on conceptual understandings. A concept is a general idea, thought, or understanding. Conceptual understandings are what learners know and understand about a concept. When the concepts are elaborated into generalisations, they become conceptual understandings. It is expected that students will develop their understanding of concepts through time. Teachers may also choose additional concepts that may connect with the local environment or the circumstances of their students. Other concepts may apply to specific contexts, for example, rehabilitation and mitigation for extreme natural events or natural increase and dependency ratio for population. The key concepts are: Perspectives Ways of seeing the world that help explain differences in decisions about, responses to, and interactions with environments. Learn more about perspectives. Some examples of geographic processes include erosion, migration, desertification and globalisation. Patterns May be spatial: Interaction Involves elements of an environment affecting each other and being linked together. Interaction incorporates movement, flows, connections, links and interrelationships which work together and may be one or two way interactions. Landscapes are the visible outcome of interactions. Interaction can bring about environmental change. Change Involves any alteration to the natural or cultural environment. Change is a normal process in both natural and cultural environments. It occurs at varying rates, at different times and in different places. Some changes are predictable, recurrent or cyclic, while others are unpredictable or erratic. Change can bring about further change. Sustainability Involves adopting ways of thinking and behaving that allow individuals, groups, and societies to meet their needs and aspirations without preventing future generations from meeting theirs. Sustainable interaction with the environment may be achieved by preventing, limiting, minimising or correcting environmental damage to water, air and soil, as well as considering ecosystems and problems related to waste, noise, and visual pollution. These key concepts are significant in their own right and are also interrelated. Conceptual understandings underpin the knowledge and skills assessed by the NCEA achievement standards. Learn more about geography skills and concepts.

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Chapter 4 : Geography - Wikipedia

Principles and Methods in Landscape Ecology is a textbook useful to present the landscape in a multi-vision perspective for undergraduate and graduate students of biology, ecology, geography, forestry, agronomy.

These three perspectives can be represented as dimensions of a matrix of geographic inquiry as shown in Figure 3. Spatial representation, the third dimension of the matrix, underpins and sometimes drives research in other branches of geography. Such research benefits not only from bringing into one analysis ideas that are often treated separately in other disciplines but also from critically examining the disjunctures and contradictions among the ways in which different disciplines examine identical phenomena. Page 30 Share Cite Suggested Citation: New Relevance for Science and Society. The National Academies Press. Geographers focus on "real world" relationships and dependencies among the phenomena and processes that give character to any location or place. Geographers also seek to understand relationships among places: Geographers also focus on the importance of scale in both space and time in these relationships. The study of these relationships has enabled geographers to pay attention to complexities of places and processes that are frequently treated in the abstract by other disciplines. Integration in Place Places are natural laboratories for the study of complex relationships among processes and phenomena. Geography has a long tradition of attempting to understand how different processes and phenomena interact in regions and localities, including an understanding of how these interactions give places their distinctive character. The systematic analysis of social, economic, political, and environmental processes operating in a place provides an integrated understanding of its distinctiveness or character. Research in this tradition since has shown that the temporal and spatial sequences of actions of individuals follow typical patterns in particular types of environments and that many of the distinctive characteristics of places result from an intersection of behavioral sequences constrained by spatial accessibility to the opportunities for interaction. Such systematic analysis is particularly central to regional and human geography, and it is a theme to which much geographic research continually returns. When such systematic analysis is applied to many different places, an understanding of geographic variability emerges. Of course, a full analysis of geographic variability must take account of processes that cross the boundaries of places, linking them to one another, and also of scale. Interdependencies Between Places Geographers recognize that a "place" is defined not only by its internal characteristics but also by the flows of people, materials e. These flows introduce interdependencies between places that can either reinforce or reduce differences. For example, very different agricultural land-use practices have evolved under identical local environmental conditions as a result of the distance to market affecting the profitability of crops. At a macroscale, the widespread and global flow of Western cultural values and economic systems has served to reduce differences among many peoples of the world. An important focus of geography is on understanding these flows and how they affect place. The challenge of analyzing the flows and their impacts on place is considerable. Such relationships have all the characteristics of complex nonlinear systems whose behavior is hard to represent or predict. These relationships are becoming increasingly important for science and decision making, as discussed in Chapters 5 and 6. Interdependencies Among Scales Geographers recognize that the scale of observation also matters for understanding geographic processes and phenomena at a place. Although geography is concerned with both spatial and temporal scales, the enduring dimension of the geographic perspective is the significance of spatial scales, from the global to the highly local. Geographers have noted, for example, that changing the spatial scale of analysis can provide important insights into geographic processes and phenomena and into understanding how processes and phenomena at different scales are related. A long-standing concern of geographers has been the "regionalization problem," that is, the problem of demarcating contiguous regions with common geographic characteristics. Geographers recognize that the internal complexity and differentiation of geographic regions is scale-dependent and, thus, that a particular set of regions is always an incomplete and possibly misleading representation of geographic variation. Identifying

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the scales at which particular phenomena exhibit maximum variation provides important clues about the geographic, as well as the temporal, scope of the controlling mechanisms. For example, spectral analyses of temperature data, revealing the geographic scales at which there is maximum similarity in temperature, can provide important clues about the relative influence of microclimates, air masses, and global circulation on temperature patterns. A global rise in average temperature could have highly differentiated local impacts and may even produce cooling in certain localities because of the way in which global, regional, and local processes interact. By the same token, national and international economic and political developments can have highly differentiated impacts on the economic competitiveness of cities and states. The focus on scale enables geographers to analyze the impact of global changes on local events and the impact of local events on global changes. Page 32 Share Cite Suggested Citation: There are two other important domains of synthesis within geography as well: The relationships that it studies—the dynamics relating society and its biophysical environment—today are not only a core element of geography but are also of increasingly urgent concern to other disciplines, decision makers, and the public. Although the work of geographers in this domain is too varied for easy classification, it includes three broad but overlapping fields of research: Human Use of and Impacts on the Environment Human actions unavoidably modify or transform nature; in fact, they are often intended specifically to do so. These impacts of human action have been so extensive and profound that it is now difficult to speak of a "natural" environment. Geographers have contributed to at least three major global inventories of human impacts on the environment Thomas, ; Turner et al. Studies at local and regional levels have clarified specific instances of human-induced landscape transformation: Geographers study the ways in which society exploits and, in doing so, 2 Citations in this section do not refer to major research contributions since these are the focus of Chapter 5. They refer the reader to books and articles that provide a more detailed discussion of the topic than can be provided here. Page 33 Share Cite Suggested Citation: Geographers ask why individuals and groups manipulate the environment and natural resources in the ways they do Grossman, ; Hecht and Cockburn, They have examined arguments about the roles of carrying capacity and population pressures in environmental degradation, and they have paid close attention to the ways in which different cultures perceive and use their environments Butzer, They have devoted considerable attention to the role of political-economic institutions, structures, and inequities in environmental use and alteration, while taking care to resist portraying the environment as an empty stage on which social conflicts are acted out Grossman, ; Zimmerer, ; Carney, Environmental Impacts on Humankind Consequences for humankind of change in the biophysical environment—whether endogenous or human-induced—are also a traditional concern for geographers. For instance, geographers were instrumental in extending the approaches of environmental impact analysis to climate. They have produced important studies of the impact of natural climate variation and projected human-induced global warming on vulnerable regions, global food supply, and hunger. They have studied the impacts of a variety of other natural and environmental phenomena, from floods and droughts to disease and nuclear radiation releases Watts, ; Kates et al. These works have generally focused on the differing vulnerabilities of individuals, groups, and geographic areas, demonstrating that environmental change alone is insufficient to understand human impacts. Rather, these impacts are articulated through societal structures that give meaning and value to change and determine in large part the responses taken. Human Perceptions of and Responses to Environmental Change Geographers have long-recognized that human-environment relations are greatly influenced not just by particular activities or technologies but also by the very ideas and attitudes that different societies hold about the environment. Geographers have also recognized that the impacts of environmental change on human populations can be strongly mitigated or even prevented by human action. Accurate perception of change and its consequences is a key component in successful mitigation strategies. Geographers studying hazards have made important contributions to understanding how perceptions of risk vary from reality Tuan, and how communication of risk can amplify or dampen risk signals Palm, ; Kasperson and Stallen, Accurate perceptions of available mitigation strategies is an important aspect Page 34 Share Cite Suggested Citation: In the case of floodplain occupancy, for instance,

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such options include building flood control works, controlling development in flood-prone areas, and allowing affected individuals to absorb the costs of disaster. In the case of global climate change, options range from curtailing greenhouse gas e. Geographers have assembled case studies of societal responses to a wide variety of environmental challenges as analogs for those posed by climate and other environmental change and have examined the ways in which various societies and communities interpret the environments in questions Jackson, ; Demeritt, ; Earle, Environmental Dynamics Geographers often approach the study of environmental dynamics from the vantage point of natural science Mather and Sdasyuk, Society and its roles in the environment remain a major theme, but human activity is analyzed as one of many interrelated mechanisms of environmental variability or change. Efforts to understand the feedbacks among environmental processes, including human activities, also are central to the geographic study of environmental dynamics Terjung, As in the other natural sciences, advancing theory remains an overarching theme, and empirical verification continues to be a major criterion on which efficacy is judged. Physical geography has evolved into a number of overlapping subfields, although the three major subdivisions are biogeography, climatology, and geomorphology Gaile and Willmott, Those who identify more with one subfield than with the others, however, typically use the findings and perspectives from the others to inform their research and teaching. Boundaries between the subfields, in turn, are somewhat blurred. Biogeographers, for example, often consider the spatial dynamics 3 of climate, soils, and topography when they investigate the changing distributions of plants and animals, whereas climatologists frequently take into account the influences that landscape heterogeneity and change exert on climate. Geomorphologists also account for climatic forcing and vegetation dynamics on erosional and depositional process. The three major 3 The term spatial dynamics refers to the movement, translocation of, or change in phenomena both natural and human over geographic space. The study of spatial dynamics focuses on the natural, social, economic, cultural, and historical factors that control or condition these movements and translocations. Page 35 Share Cite Suggested Citation:

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Chapter 5 : Key concepts / Geography / Social sciences / Home - Senior Secondary

Principles of landscape science and physical-geographic & Zatorski, R. J. , Principles of landscape science and physical-geographic regionalization /.

The course uses primarily electronic sources for current data gathering and various types of geographic analysis, supported by lecture and discussion. This course may be taken to satisfy the Diversity in World Cultures requirement as a social science elective in the UCA Core, but it may not count toward the hour geography major or the hour geography minor. This course may be taken to satisfy the Inquiry and Analysis social science elective in the lower-division UCA Core, but it may not count toward the hour geography major or the hour geography minor. In a lecture and discussion format, this course is a topical assessment of the spatial diversity of the natural environment, including landforms, weather and climate, soils, vegetation, and water, along with their significance in terms of human occupation of the earth. In a lecture and discussion format, this course examines the spatial variability of human characteristics across the surface of the earth. Topics include the geography of culture, population, language, religion, settlement, agriculture, urbanization, and political activities. Physical geographic perspectives e. This course uses a lecture and discussion format to provide information about description, inferential, and relational statistics as these techniques are employed in spatial analysis; also included is that set of quantitative methods used in conjunction with map analysis termed spatial statistics. This course, through lectures, readings and assigned projects, introduces students to the significant components of contemporary geographic research methods. Topics may include the scientific method, research paper structure, citation methodology, archival research, field research methodology, writing and using surveys, the Institutional Review Board, and the use of geospatial technology in research. This course must be taken prior to or in conjunction with the first upper-division course in geography. Cartography today revolves around the study of the theory, science, and technology behind the production of maps and spatial databases. This computer lab-oriented, exercised-based course instructs students on cartographic design and convention, the construction of reference and thematic maps using mapping software, and the collection and classification of geographic data for mapping. Fall, spring, summer on demand. An elective for geography majors and minors. A structured, supervised, work experience in an academic format. The student is assigned to a specific agency and completes a minimum of hours during the semester enrolled. This course is normally taken for 3 credit hours but can be taken for 6 credit hours if the job assignment requires additional time. Agency assignment and credit hours will be determined through student consultation with the geography program internship director. This course uses a lecture and discussion format in an assessment of the physical, social, economic, and political considerations in the examination of major global natural resource issues with emphasis on the United States. The historical development and contemporary application of the conservation philosophy of resource use are discussed. GEOG or consent of instructor. This course employs a lecture and discussion format, supplemented by outside readings and research, to explore physical and cultural environments in arid and semi-arid lands and to develop strategies pertinent to planning for the future. This computer lab-oriented course introduces the student to the realm, principles, and capabilities of a widely applicable technology, geographic information systems GIS. A short lecture and lab exercise format are employed to develop understanding of and practically apply the fundamental concepts of GIS. Emphasis is placed on life-based applications of GIS technology; a simple research project is required. GEOG and or consent of instructor. The course uses lectures and class discussions to provide a description and explanation of m a spatial patterns of economic activities, including manufacturing, transportation, information and financial services, and consumption. Classical location theories of Von Thunen, Weber, and Christaller are included along with contemporary theories of globalization. The course introduces students to the history and science of remote sensing,as well as to the principles of image interpretation and basic photogrammetry. Classroom activities include lectures, lab exercises, and term projects. GEOG or consent of the instructor. The

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course examines example applications and enables students to use GIS software to complete computer-based exercises and for project development. Vector GIS is emphasized. Topics such as human impact on the landscape, environmental hazards, endangered species habitat inventory and protection, and point and non-point pollutant sources will be addressed in short lectures and example applications. The student will use GIS software to complete directed exercises, as well as for development of an individual project. Raster GIS is emphasized. Using a lecture and discussion format, an examination and comparison of the various nations that comprise Latin America is achieved. Past and present distribution of plants and animals will be described through systematic and integrative studies, and factors of location including geographical, environmental, and historical, will be discussed. The course consists of lecture and discussion. Typically students keep journals and write papers about their experiences. GEOG or and consent of instructor. Using a lecture and discussion format, a macrospatial analysis of planning techniques and case studies as evolving in the US is emphasized. Rapidly changing trends, philosophies, and techniques in the planning field are combined to better understand the locational decisions impacting transportation and urban growth. This course uses a lecture and discussion format in identifying geomorphic and atmospheric phenomena e. Human responses to the various natural hazards are assessed and common adjustments identified. Students will learn about the physical and human geography of Europe and the Russian Federation. Emphasis is on landforms, weather and climate, soils, vegetation, settlement, migration and expansion, agriculture, industry, urban and rural life, and politics. Lectures, discussion, and video films will enable students to understand the issues, challenges, and diversity in the region. This course uses a lecture and discussion format in the identification and assessment of atmospheric processes. Using a lecture and discussion format, this course analyzes the various aspects of the distribution of urban settlements, the internal structure of urban areas, and an analysis of the growth, development, and problems of the American city. The course, through lectures and class discussions, examines the physical and human geography of the state of Arkansas. Topics include landforms, weather, climate, settlement, poverty, politics, agriculture, and lumbering, among others. Using a lecture and discussion format, the spatial perspective of political phenomena is analyzed. Traditional topics include the coincidence of state and nation, boundaries, claims to territory, and state location, shape, and size. Contemporary topics include political processes and territory, integration, location, residential quality, economic factors, and local policy in metropolitan areas. A worldwide study of past and present patterns of food production, consumption, and problems, using a lecture, discussion, and visual presentations format. Specific environmental conditions and cultural complexes which significantly influence food production and diet are examined. Independent readings, discussions, and writings are completed in specific areas of geography that are of particular interest to the student. Credit from one to three semester hours may be earned in one semester. May be repeated for a total of six hours, but only three hours may be applied toward the major. R] SOILS An upper-division elective, this course introduces the soil environment, including soil properties and components, soil controls, soil-forming processes, soil classification, conservation and management, and use of the soil survey. This course uses a lecture format combined with field study to acquaint students with the nature and characteristics of soils. Emphasis is on the oceanic physical environment and natural resources. This course uses a lecture and discussion format in the analysis of the physical, economic, and social aspects of outdoor recreation and tourism. Emphasis is on outdoor recreation activity and tourism in the United States and Arkansas. A seminar-oriented, discussion-based course, which analyzes significant trends of thought that have emerged in human geography since This is an advanced-level course in GIS. It provides an understanding of analysis in GIS environment, knowledge of GIS design and implementation, an insight into spatial variability and geostatistics, and an experience in error propagation analysis within GIS. Emphasis of lectures and practical lab exercises is placed on problem-solving GIS techniques such as layering, networking, buffering, and querying. Environmental modeling and decision support system creation in real-life research projects executed by students is also an objective of this course. The course uses a lecture and discussion format to gain a comprehensive understanding of the evolving human geography of the United States during the past four

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centuries. This course uses a seminar format to introduce the student to scientific research methods and quantitative techniques with emphasis on geographic research. These methods and techniques are used to initiate investigation into a contemporary student-identified geographic problem and to develop a formal research proposal. GEOG , junior status, 15 semester hours of geography, and a course in quantitative methods with a passing grade.