

Master of Science in Applied Geosciences and GIS

Program code: 200020

INTRODUCTION

The College of Science and the College of Social Science at Kuwait University offer a joint Master of Science degree in **Master of Science degree in Applied Geosciences and Geographic Information Science (GIScience)**. It is a professional Joint Degree Program combining relevant specializations in the departments of Geography, and Earth & Environmental Sciences. The program focuses on three main fields of concentration: Geography, Geology and Geographic Information System (GIS). Each of these fields offers applied courses that cover advanced topics and applied methodologies.

Graduates of this program can apply their skills to urban management, public services, geophysical exploration, transportation planning and analysis, site selection, real estate, environmental management, water resources, agricultural and industrial planning, and all other services related to spatial data analysis and management.

PROGRAM REQUIREMENTS

36 TOTAL COURSE CREDITS

24 COMPULSORY COURSES (3 credits each)

2095-521 Scientific Writing

2095-522 Spatial Analysis

2095-523 Fieldwork Skills and Techniques

2095-524 Environmental Geology

2095-531 Geographic Information System (GIS)

Equivalent to 1340-516

2095-533 Remote Sensing

Equivalent to 1340-511

2095-535 Research Methods

2095-593 Project

12 ELECTIVE COURSES* (3 credits each)

6 Group A (Geography)

2095-513 Advanced Geographical Information Systems

2095-514 Advanced Remote Sensing

2095-532 Advanced Spatial Analysis

2095-544 Application in Geographic Technologies

6 Group B (Geology)

2095-506 Desert Geomorphology

Equivalent to 1340-508

2095-525 Topics in Climate Change

2095-527 Coastal Environment & Geomorphology

2095-528 Natural Hazards

2095-529 Special Topic
2095-530 Marine Ecosystems

COURSE DESCRIPTION

2095-506: DESERT GEOMORPHOLOGY CR: 3

This Course Is Designed to Discuss Factors Affecting Surface Forms in Arid Regions. Special Attention Is Paid to The Study of Wind Action and Its Effect on Erosion, Transportation and Deposition. Classification Of Desert Surfaces into Different Units Are Discussed, And Their Geomorphologic Significations Are Shown.

2095-513: ADVANCED GEOGRAPHICAL INFORMATION SYSTEMS CR: 3

This Course Aims to Highlight the Role of Geographic Information Systems in Understanding the Problems That Might Face Us in Our Daily Life by Using Various Spatial Analysis Tools Available in GIS Programs. The Course Also Aims to Increase the Student's Geographical Analytical Ability Through Numerous Exercises That Have a Role in Increasing Awareness of The Importance of Geographic Information Systems. GIS Are Considered as One of The Important Tools of Our Time to Keep Abreast of The Latest Developments in The Problems Faced by Countries or Societies Because Of The Power of GIS In Reducing Time in Order to Take the Correct Decision That We Might Face in The Future. Through This Course the Student Will Be Able to Identify New Methods of Spatial Analysis by Using Geographic Information Systems.

2095-514: ADVANCED REMOTE SENSING CR: 3 Pre: 2095-522, 2095-533

The course presents radar and LIDAR principles and applications of remote sensing of vegetation, water, soil, and urban landscape. Also, the course focuses on essential skills in processing and analyzing remotely sensed data, such as the image quality assessment and statistical evaluation of remotely sensed data, scientific visualization, radiometric correction, geometric correction, image enhancement, thematic information extraction, digital change detection, and accuracy assessment.

2095-521: SCIENTIFIC WRITING CR: 3

This Course Provides the Student with The Fundamental Scientific Writing Skills Starting from Browsing Literature for The Introduction and Finishing with The Paper Submission. The Main Objective of The Course Is the Formation of Skills for The Presentation of Research Results in The Format of Oral or Poster Presentations at Conferences, The Writing of Scientific Publications (Reports, Theses, Dissertations, And Articles) And the Preparation of Applications for Scientific Grants, Participation in Scientific Academic Projects.

2095-522: SPATIAL ANALYSIS CR: 3

This Course Aims to Provide Students with The Knowledge and Skills Necessary to Investigate the Spatial Patterns Which Result from Social and Physical Processes Operating on Or Near the Earth's Surface. Statistical Concepts Related to Spatial Analysis Are Introduced in This Course as Well as Essential Theoretical Concepts of Quantitative Geography Including Measures of Geographical Distribution (Including Point and Areal Pattern Analysis) And Spatial Autocorrelation, Interpolation, And Network Connectivity. The Focus Is on Understanding the Theories and Context of Spatial Analysis So That the Students Can Find and Apply the Best Analytical Tool for Their Problem and To Interpret and Present Their Results Correctly and Appropriately.

2095-523: FIELD SKILLS AND TECHNIQUES CR: 3

This Course Is Designed to Provide Students with Essential Skills and Techniques in Geology, Geography, And Environmental Perspectives. Geologic, Geographic, And Environmental Aspects and Principles Will Be Studied to Cover Spatial Relationships. The Course Is Taught in Both: The Classroom and In the Field. In The Field, Students Will Be Capable of Producing State-Of-The Art Maps to And Make Invaluable Interpretations in Unparalleled Opportunity to Study the Real World.

Fieldwork Also Reinforce Classroom-Based Learning and Increases Student's Knowledge, Skills, And Subject Understanding.

2095-524: ENVIRONMENTAL GEOLOGY

CR: 3

This Is a Multidisciplinary Course That Covers a Broad Range of Topics, Ranging from Earth Materials and Their Use to Earth Processes, Including Natural Hazards and Their Impact on Human Lives. This Course Also Includes Understanding the Environmental Effects of Exploring and Utilizing Natural Resources and Identifying the Different Ways to Minimize These Impacts to Maintain Environmental Sustainability.

2095-525: TOPICS IN CLIMATE CHANGE

CR: 3

This Course Is Designed to Deliver an Understanding of The Scientific Basis of Climatic Change and Will Expose Students to Multiple Facets of An Interdisciplinary and Encompassing Field. It Will Include the Physical Science of The Climate System, The Contributing System Components, And the Basic Mechanisms That Govern How the Climate System Responds to Drivers of Change. This Course Explores Climate Change from Multiple Perspectives: Recent Historical Variability and Change, Future Climate Projections, Climate Change Adaptation as Well as Environmental, Social and Economic Issues.

2095-527: COASTAL GEOMORPHOLOGY & ENVIRONMENT

CR: 3

This Advanced Course of Coastal Geomorphology Covers the Study of The Shape, The Environmental Processes and Evolution of Coastal Landforms. Students Will Develop a Practical Understanding of Coastal Dynamics Through a Combination of Theoretical Conceptual Models Which Examine the Importance of Coastal Geomorphic Forms and Their Management Through Sustainable Practices. The Course Examines the Dynamics of The Coastal Zone, Its Physical Workings and Techniques to Measure and Monitor Processes and Change in The Coastal Environment, Such as Examining Beach Erosion and Impacts of Sea-Level Rise.

2095-528: NATURAL HAZARDS –

Cr: 3

This Course Reviews Natural Hazards from Geological and Historical Perspectives and Their Impacts on Humankind. It Describes Relevant

Geologic Processes and Natural Disasters That Are Produced by Events Such as Earthquakes, Volcanic Eruptions, Land Subsidence, Sinkholes and Ground Failure, Tsunamis and Coastal Hazards, Flashfloods, And Bolide Impacts.

2095-529: SPECIAL TOPIC

CR: 3

This Course Covers Several Basic Aspects of Human and Physical Geography. It Starts with An Introduction to Human and Physical Geography. The Relationship of Geography to Other Disciplines Will Be Explained. This Includes How Geography Impacts the Environment (I.E., As Physical Science) And People (I.E., As Social Science or Humanities). The Course Also Introduces Students with Firm Knowledge Regarding the Anthropogenic Factors on The Environment, Principles of Human Geography with A Special Reference to Population Patterns, Growth, Densities, And Urban Studies. Also, The Geologic and Geomorphic Patterns on Earth Will Be Studied in Relation to Human Geographic Perspectives.

2095-530: MARINE ECOSYSTEMS

CR: 3

The Course Provides a Broad Overview of The Theoretical, Practical and Applied Aspects of The Ecosystem Dynamics in The Marine Environment. This Is Done in Favor of a Greater Focus on Theoretical and Practical Background of Ecosystem Dynamics, Marine Environmental Monitoring and Practical Applications. The Course Aims to Provide an Understanding of The Patterns of Abundance and Diversity of Marine Plants and Animals and The Processes That Structure These Patterns. Emphasis Is Placed on The Challenges in Understanding the Complexity of Marine Systems and The Solutions to Quantifying Them.

2095-531: GEOGRAPHIC INFORMATION SYSTEM

CR: 3

This Course Introduces the Fundamentals, Theoretical and Practical Parts, Of Geographic Information Systems. Geographic Information System Has a Relationship with Spatial Thinking in Which Learning GIS Can Increase Spatial Thinking Skill. This Course Works on Building Students Scientific and Practical Mental Capabilities and Introducing Students to The Use of Modern Spatial Systems Technologies, Such as GIS In Geographical Studies and Spatial Analysis. This Course Is Important for Teaching and

Training Students on The Importance of Designing GIS Learning Material Based on Spatial Thinking in The Creation of Databases and Electronic Maps. This Course Also Builds Students' Skills in Using the Multiple Functions of GIS In Spatial Analysis. This Course Is Considered the Basic Building Block from Which the Student Proceeds to Study Advanced Courses in The Field Of GIS, And Spatial Thinking in Scientific Research.

2095-532: ADVANCED SPATIAL ANALYSIS

CR: 3

Pre: 2095-522

This course challenges students with existing skills in data manipulation and analysis using geographical information systems (GIS) and/or programming languages (e.g., R and PYTHON) to expand their knowledge of geographic information science. Students will develop and apply advanced data analysis techniques to propose, construct and carry out a major research project in an area of interest. The theoretical foundation of the principles behind spatial analysis is covered in some depth, while practical sessions guide students in the development of increasingly sophisticated spatial analysis capabilities. The aim of the course is to provide deeper insights into geographical data analysis. The course covers different regression techniques (e.g., OLS, logistic regression, and poisson regression) and cluster analysis, focusing on their application in geographical analysis. ANOVA and hierarchical models are also touched upon.

2095-533: REMOTE SENSING

CR: 3

The primary objective of this introductory course is to give the student a solid foundation in principles relating to remote sensing of the earth's environment. The student will study in this course the development of remote sensing as a field of study, the nature and principle of electromagnetic radiations, aerial photography, digital imagery, earth observation satellites, thermal imagery, and introduction to digital image analysis. This course has lab work in which the student will gain the fundamental skills on how to deal with and manipulate remotely sensed data. Remote sensing field. Also, the students will be encouraged to read external sources to broaden their knowledge in remote sensing field.

5095-535: RESEARCH METHODS

CR: 3

Pre: 2095-521

This course focuses on the scientific writing of research projects and reports in geography or geology. Students will be trained to utilize electronic resources (journals, books, website, etc.) And collect articles of choice to be discussed and presented individually during the semester. The student must write short research compiling all previously collected articles of choice and give a final presentation followed by discussion.

2095-544: Application in Geographic Technologies

CR: 3

Pre: 2095-522, 2095-531, 2095-533

This course aims to highlight the role of geographic information science in understanding the problems that might face us in our daily life by using various spatial analysis tools. The course also aims to increase the student's geographical analytical ability through numerous exercises that have a role in increasing awareness of the importance of geographic information science. Through this course the student will be able to identify and use advanced geographic technologies and new methods of spatial analysis by software packages and/or instruments.

2095-593: GRADUATION PROJECT

CR: 3

PR: 2095-521, 2095-522, 2095-523, 2095-524, 2095-531, 2095-533, 2095-535 & passing the Comprehensive Exam.

This course is designed to give students the opportunity to conduct an independent project after approval of three parties: a supervisor, an organizational authority as an end-user, and the College of Graduate Studies. The project develops and demonstrates student's competence in using GIS and RS techniques in a substantive application to his/her field of interest. Projects must be developed in cooperation with a local governmental authority, utility, business, or other entity, which uses GIS and RS in its operations and research. A formal presentation and a project report are required.