CURRICULUM

OF

GEOGRAPHY

BS/MS/MPHIL

(Revised 2013)

HIGHER EDUCATION COMMISSION
ISLAMABAD

CURRICULUM DIVISION, HEC

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Mr. Fida Hussain	Director General (Acad)
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PREFACE

The curriculum, with varying definitions, is said to be a plan of the teaching-learning process that students of an academic programme are required to undergo. It includes objectives & learning outcomes, course contents, scheme of studies, teaching methodologies and methods of assessment of learning. Since knowledge in all disciplines and fields is expanding at a fast pace and new disciplines are also emerging; it is imperative that curricula be developed and revised accordingly.

University Grants Commission (UGC) was designated as the competent authority to develop, review and revise curricula beyond Class-XII vide Section 3, Sub-Section 2 (ii), Act of Parliament No. X of 1976 titled **"Supervision of Curricula and Textbooks and Maintenance of Standard of Education".** With the repeal of UGC Act, the same function was assigned to the Higher Education Commission (HEC) under its Ordinance of 2002, Section 10, Sub-Section 1 (v).

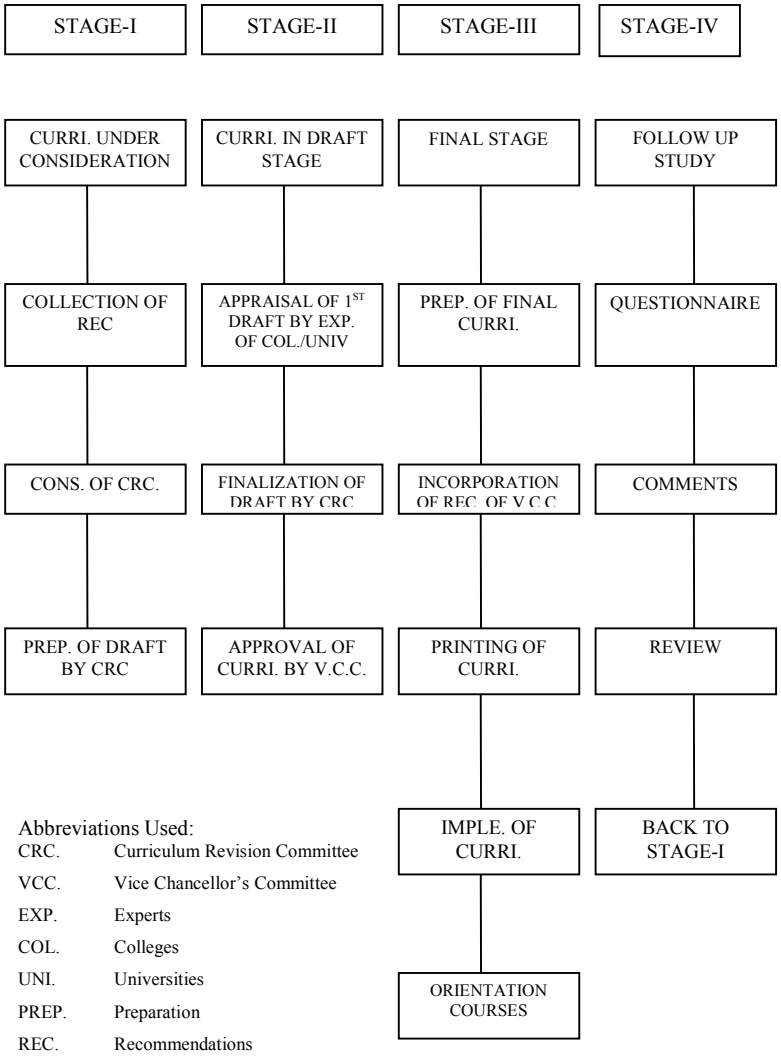
In compliance with the above provisions, the Curriculum Division of HEC undertakes the revision of curricula after every three years through respective National Curriculum Revision Committees (NCRCs) which consist of eminent professors and researchers of relevant fields from public and private sector universities, R&D organizations, councils, industry and civil society by seeking nominations from their organizations.

In order to impart quality education which is at par with international standards, HEC NCRCs have developed unified templates as guidelines for the development and revision of curricula in the disciplines of Basic Sciences, Applied Sciences, Social Sciences, Agriculture and Engineering in 2007 and 2009.

It is hoped that this curriculum document, prepared by the respective NCRC's, would serve the purpose of meeting our national, social and economic needs, and it would also provide the level of competency specified in Pakistan Qualification Framework to make it compatible with international educational standards. The curriculum is also placed on the website of HEC (www.hec.gov.pk).

(Fida Hussain)
Director General (Academics)

CURRICULUM DEVELOPMENT PROCESS



Abbreviations Used:

CRC.	Curriculum Revision Committee
VCC.	Vice Chancellor's Committee
EXP.	Experts
COL.	Colleges
UNI.	Universities
PREP.	Preparation
REC.	Recommendations

CONTENTS

INTRODUCTION:

MINUTES OF THE FINAL MEETING OF NCRC IN THE DISCIPLINE OF GEOGRAPHY HELD ON APRIL 23~25, 2013 AT HEC REGIONAL CENTRE, LAHORE

The final meeting of National Curriculum Revision Committee in the discipline of Geography was held on April 23-25, 2013 at Higher Education Commission, Regional Centre, Lahore. The purpose of the meeting was to finalize the curriculum of Geography reviewed by NCRC in its preliminary meeting held on December 12-14, 2012 at the same venue. The following members attended the meeting:

1.	Dr. Syed Jamil Hasan Kazmi, Professor, Department of Geography, University of Karachi, Karachi.	Convener
2.	Prof. Dr. Abdul Ghaffar, Professor & Chairman, Department of Geography, University of the Punjab, Lahore.	Member
3.	Prof. Dr. Farkhunda Burke, Professor & Chairperson, Department of Geography, University of Karachi, Karachi.	Member
4.	Dr. Tabasum Jamal, Professor, Department of Geography, University of the Punjab, Lahore	Member
5.	Prof. Dr. Zulfiqar Ahmad, Professor, Department of Earth Sciences, Quaid-i-Azam University, Islamabad.	Member
6.	Prof. Muhammad Sharif Shaikh, Professor & Chairman, Department of Geography, Shah Abdul Latif University, Khairpur.	Member
7.	Mrs. Bushra Sharif, Professor, Department of Geography, Lahore College for Women University, Lahore.	Member
8.	Dr. Iftikhar Ahmad, Chairman, Department of Geography,	Member

University of Balochistan, Quetta.

9.	Dr. Asad Ali Khan, Chairman, Department of Geography, The Islamia University of Bahawalpur, Bahawalpur.	Member
10.	Dr. Muhammad Mushahid Anwar, Associate Professor & Chairman Department of Geosciences & Geography, University of Gujrat, Gujrat.	Member
11.	Dr. Ali Iqtadar Mirza, Chairman, Department of Geography, Government College University, Lahore.	Member
12.	Mr. Muhammad Shafqaat Anjum, Chairman, Department of Geography, GC University, Faisalabad.	Member
13.	Dr. Shahibzad Khan, Director, Regional Meteorological Center, Lahore.	Member
14.	Dr. Ihsanullah, Assistant Professor, Institute of Geography, Urban & Regional Planning, University of Peshawar, Peshawar.	Member
15.	Dr. Sheikh Saeed Ahmad, Assistant Professor, Department of Environmental Sciences, Fatima Jinnah Women University,The Mall, Rawalpindi.	Member
16.	Dr. Ibtisam Butt, Assistant Professor, Department of Geography, University of the Punjab, Lahore.	Member/Secretary
17.	Dr. Omar Riaz, Assistant Professor, Department of Earth Sciences, University of Sargodha, Sargodha.	Member
18.	Mr. Noor Hussain Chandio, Lecturer, Department of Geography, Shah Abdul Latif University, Khairpur.	Member

2. The following members could not attend the meeting due to other engagements:

1.	Mrs. Zareen Jameel Qureshi, Assistant Professor, Department of Geography, Forman Christian College, Lahore.	Member
2.	Dr. Fazlur Rahman, Assistant Professor, Department of Geography, University of Peshawar, Peshawar.	Member/Secretary
3.	Mr. Muhammad Nawaz, Assistant Professor, Department of Geography, University of Balochistan, Quetta.	Member

3. The meeting started with the recitation of Holy Verses from the Holy Quran by Mr. Farrukh Raza, Assistant Director (Curriculum), HEC. He welcomed the Members of NCRC on behalf of the HEC. After brief introduction of the participants, the Assistant Director (Curriculum), HEC, handed over floor of the house to the Convener NCRC viz. Dr. Syed Jamil Hasan Kazmi, Professor, Department of Geography, University of Karachi, for further proceedings of the meeting. Since Dr. Fazlur Rahman, Secretary of the preliminary meeting of NCRC regretted his inability to join the final meeting, the house unanimously elected Dr. Ibtisam Butt, Assistant Professor, University of the Punjab, Lahore, as the Secretary of the meeting.

4. The Convener of NCRC thanked the HEC for providing an opportunity to review / finalize the curriculum of Geography and recalled the proceedings of the preliminary meeting. He further requested the participants to give their suggestions/inputs for the improvement of the curriculum and opened the house for discussion. After thorough and detailed deliberations, the house unanimously approved the curriculum of Geography for BS, MS/M.Phil and made the recommendations **as Annexed**.

5. The Convener and Secretary of the Committee thanked all the Members for sparing their valuable time and quality contribution towards finalizing the curriculum. The Committee highly admired the efforts made by the officials of HEC as well for making excellent arrangements to facilitate the smooth work by the Committee and their comfortable accommodation/stay at Lahore.

6. The meeting ended with the vote of thanks to the Chair as well as participants of the meeting.

VISION

To introduce the most recent perspective of Geography and enhance awareness of the earth as a living planet with reference to man-environment interaction and resulting physical and human phenomena and their spatial variation amongst students of the discipline and allied sciences.

MISSION

- To employ Geography as an integral part of education from primary to higher levels of education;
- To enhance the quality of geographical education for broader applications and its implementation for the resolution of human problems;
- To promote Geography as an important discipline for the enhancement of quality of environment and wellbeing of humanity;
- To develop pragmatic geographic research in order to make it effective in our daily lives;
- To expand the geographic research horizons and to effectively integrate it with the national planning and development;
- To create a comprehensive insight for appreciating current world affairs embracing the modern geographic arena; and
- To extend the integration of Geography with other disciplines of science and humanities.

Aims and objectives

1. To develop a standardised Geography curriculum for four years BS and two years MPhil/MS., so that uniformity could be assured in the Public and Private sector institutions across the country.
2. To impart current knowledge and practical skills to Geography graduates through theory, practicum and field exercises.

4 YEARS BACHELOR STUDIES IN GEOGRAPHY

1. **Eligibility**

   Intermediate or equivalent (all disciplines) not less than 45% marks.
2. **Duration**
   Four years programme spread over 8 semesters (two semesters per year).
3. **Degree Requirement**
   Minimum of 124 credits are required to complete 4 years BS in Geography.
4. **Evaluation**

For uniformity in the evaluation system, NCRC recommends that the minimum CGPA required to pass a semester is 2.0 out of 4.0 at an undergraduate level or as decided by the respective universities, as per rules in vogue.

STANDARDIZED FORMAT/SCHEME OF STUDIES FOR 4-YEARS CURRICULA FOR BASIC SOCIAL, NATURAL AND APPLIED SCIENCES

STRUCTURE

Sr. No.	Categories	No. of Courses Min. – Max.	Credit Hours Min. – Max.
1.	Compulsory Requirement	9 – 9	25 – 25
2.	General Courses to be chosen from other disciplines	7 – 8	21 – 24
3.	Discipline Specific Foundation Courses	9 – 10	30 – 33
4.	Major Courses including research project / Internship	11 – 13	36 – 42
5.	Electives within the Major	4 – 4	12 – 12
	Total	**40 – 44**	**124 – 136**

- Total numbers of Credit hours 124-136
- Duration 4 years
- Semester duration 16-18 weeks
- Semesters 8
- Course Load per Semester 15-18 Credit hours
- Number of courses per semester 4-6 (not more than 3 labs./ practical courses)

LAYOUT

Compulsory Requirements (the student has no choice)	General Courses to be chosen from other departments		Discipline Specific Foundation Courses		Major courses including research project/internship		Elective Courses within the major		
9 courses	7-8 courses		9-10 courses		11-13 courses		4 courses		
25 Credit hours	21-24 Cr. Hours		30-33 Credit hours		36-42 Credit hours		12 Credit Hours		
Subject	Cr hr	Subject	Cr hr	Subject	Cr hr	Subject	Cr hr	Subject	Cr hr
1. ENGLISH I	3	G-1	3	Fundamentals of Geography	3	Climatology	3	ELECTIVE-I	3
2. ENGLISH II	3	G-1I	3	Physical Oceanography	3	Economic Geography	3	ELECTIVE-II	3
3. ENGLISH III	3	G-1II	3	Human Geography	3	Research Methods	3	ELECTIVE-III	3
4. ENGLISH IV/ UNIV. OPTIONAL *	3	G-V	3	Map work	3	Regional Concepts	3	ELECTIVE-IV***	3
5. PAKISTAN STUDIES	2	G-VI	3	Geography of Pakistan	3	Geographical Information Sciences	3		
6. ISLAMIC STUDIES / ETHICS	2	G-VII	3	Land Surveying	3	Remote Sensing	3		
7. MATHEMATICS I	3	G-VIII	3	History & Development of Geographic Thought	3	Settlement Geography	6		
8. MATHEMATICS II / UNIV. OPTIONAL **	3			Principles of Cartography	3	Population Geography	3		
9. INTRODUCTION TO COMPUTERS	3			Quantitative Geography	3	Field Study	3		
				Environmental Geography	3				
	25		**24**		**30**		**36**		**12**
									2
									3

Major courses including research project/internship		Elective courses within the Major	
11-13 courses		**4 courses**	
36-42 credit hours		**12 credit hours**	
Subject	**Cr. hr.**	**Subject**	**Cr. hr.**
Geomorphology	3	ELECTIVE –I	3
Climatology	3	ELECTIVE –II	3
Oceanography	3	ELECTIVE –III	3
Economic Geography	3	ELECTIVE –IV***	3
Research Methods	3		
Settlement Geography	3		
Geographical Information	3		
Sciences	3		
Remote Sensing	3		
Region and Regional	3		
Concept	6		
Population Geography			
Research			
Project/Internship			

* University has the option to recommend German, French, Arabic, Chinese and any other course in lieu of English IV

** University may recommend any other course in lieu of Mathematics II

*** Any course can be chosen from Regional Geography Group D

SCHEME OF STUDY FOR
BS (Four Years)

The scheme of study for 4 years BS in Geography is given in the following table.

SCHEME OF STUDIES FOR 4 YEARS BS IN GEOGRAPHY

Semester/ Years	Course Nos.	Course Titles	Credit Hrs.
First		ENGLISH-I	3
		PAKISTAN STUDIES	2
		MATH/STAT-1	3
		GENERAL-I	3
		GENERAL-II	3
	GEOG 101	FOUNDATION-I Fundamentals of Geography	3
			17
Second		ENGLISH-II	3
		ISLAMIC STUDIES / ETHICS	2
		MATH/STAT-II / UNIV. OPTIONAL	3
		GENERAL-III	3
		GENERAL-IV	3
	GEOG 210	FOUNDATION-II Physical Geography	3
			17
Third		ENGLISH-III	3
		INTRODUCTION TO COMPUTERS	3
		GENERAL-V	3
		GENERAL-VI	3
	GEOG 220	FOUNDATION-III Human Geography	3
	GEOG 221	FOUNDATION-IV Map work	3
			18
Fourth		ENGLISH-IV / UNIV. OPTIONAL	3
		GENERAL-VII	3
		GENERAL-VIII	3
	GEOG 230	FOUNDATION-V Geography of Pakistan	3

	GEOG 280	FOUNDATION-VI Land Surveying	3
			15
Fifth	GEOG 281	FOUNDATION-VII History & Development of Geographic Thought	3
	GEOG 381	FOUNDATION-VIII Principles of Cartography	3
	GEOG 311	MAJOR-I Geomorphology	3
	GEOG 312	MAJOR-II Climatology	3
	GEOG 314	MAJOR-IV Oceanography	3
			15
Sixth	GEOG 382	FOUNDATION-IX Quantitative Geography	3
	GEOG 383	FOUNDATION-X Environmental Geography	3
	GEOG 321	MAJOR-V Economic Geography	3
	GEOG 390	MAJOR-VI Research Methods	3
	GEOG 322	MAJOR-VII Regional Concepts	3
			15
Seventh	GEOG 371	MAJOR-VIII Geographical Information Sciences	3
	GEOG 372	MAJOR-IX Remote Sensing	3
	GEOG	ELECTIVE-I (***)	3
	GEOG	ELECTIVE-II	3
	GEOG 491 Or GEOG 492	MAJOR-X / XI Digital Cartography	3
			15
Eight	GEOG 491 Or GEOG 492	MAJOR-X / XI Field Study	6
	GEOG 341	MAJOR-XII Population Geography	3
	GEOG	ELECTIVE-III	3
	GEOG	ELECTIVE-IV	3
		TOTAL – 130-136	**15**

Note: ***Students are allowed to select any four electives from the given groups.***

DETAIL OF COURSES

Foundation-I GEOG 101 Fundamentals of Geography

Objective:

To expose students with the founding principles of Geography and geographical knowledge.

Course outline:

- Introduction
  - Definitions, scope and branches of Geography
  - Roots of the discipline and basic geographic concepts
  - Themes and traditions of Geography
  - Tools of Geography
- The Universe
  - Galaxies and solar system
- The Earth as a planet
  - Celestial positions, its shape and size
  - Rotation, revolution and related phenomena
- Spheres of the earth
  - Lithosphere
  - Atmosphere
  - Hydrosphere
  - Biosphere
- Man-environment interaction
  - Population
  - Major Economic activities
  - Settlements
  - Pollution

Lab. work:
Comprehension of atlases, map reading skills, location of places, features and relevant work related to topics of the theoretical section.

Recommended Books:

Arbogast, A. F. (2007) Discovering Physical Geography, John Wiley and Sons, London.
Christopherson, R. W. (2009) Geo systems: An introduction to Physical Geography, Pearson Prentice Hall, New Jersey.
De Blij, H. J and Muller, P. O. (1996) Physical Geography of the Global Environment, USA, John Wiley and sons Inc., New Jersey.
Guinness, J. P. & Nagle, G. (2011) Geography, Hodder Education, London.
King, C. (1980) Physical Geography, Basil Blackwell, Oxford.
Miller, G. T. (2008) Living in the Environment, Principles, connections and Solutions, Wadsworth, USA.

Monkhouse, F. J. (1996) Principles of Physical Geography, Hodder & Stoughton, London.
Scott, R. C. (1996) Introduction to physical geography, West Publishing Co, New York.
Small, R. J. (1989) Geomorphology and Hydrology, Longman, London.
Strahler, A. (2013) Introduction to Physical Geography, John Wiley & Sons, New Jersey.
Stringer, E. T. (2004) Modern Physical Geography, John Wiley, New York.
Taylor, J. (1993) Integral Physical Geography, Longman, London.
Thompson, R. D. (1986) Process in Physical Geography, Longman, London.
Thornbury, W. D. (2004) Principles of Geomorphology, John Willy & Sons, New York.
Thurman, H. V. & Trujillo, A. P. (2013) Essentials of Oceanography, Prentice Hall Inc., USA.

Foundation-II GEOG 210 Physical Geography

Objective:
To create understanding about the physical characteristics of the earth

Course outline:

- Introduction
  - Definition, scope and major branches
  - Realms of the physical environment
- Lithosphere
  - Internal structure of earth
  - Rocks–origin, formation and types: Igneous, Sedimentary and Metamorphic Rocks
  - Plate tectonics, mountain building forces
  - Geomorphic processes – endogenic and exogenic processes and their resultant landforms
  - Earthquakes and volcanic activity, folding and faulting
  - Weathering, mass wasting, cycle of erosion, erosion and deposition
  - Landforms produced by running water, ground water, wind and glaciers
- Atmosphere
  - Composition and structure of atmosphere
  - Atmospheric temperature and pressure, global circulation
  - Atmospheric moisture and precipitation
  - Air masses and fronts
  - Cyclones and other disturbances
- Hydrosphere
  - Hydrological cycle
  - Ocean composition, temperature and salinity of ocean water

    - Movements of the ocean water; waves, currents and tides
- Biosphere
    - Eco-systems
    - Formation and types of soils

Lab. Work:

Identification of rocks and minerals, study and identification of landform using Satellite imageries and Topographic Sheets. Construction and applications of models showing various types of landforms. Observation and recording of weather data from a mini weather station.

Field visits:

Ground truthing and identification of various types of rocks, fluvial, glacial, desert landform, type of soils.
Visit to any suitable area to observe and appreciate the characteristics of physical features (recommended areas: Mountainous, Plains, Plateaus, deserts and coastal areas).
Visit to any national park/biosphere reserves; Soil Survey of Pakistan, Geological survey of Pakistan, Meteorological station/observatory and National Institute of Oceanography (NIO) and SUPARCO.
Observations about the clouds and identification of their types

Recommended Books:

King, C. A. M. (1980) Physical Geography, Basil Blackwell, Oxford.
Mcliveen, J. F. R. (1992) Fundamentals of Weather and climate, Prentice Hall, New Jersey.
Monkhouse, F. J. (1996) Principles of Physical Geography, Hodder & Stoughton, London.
Peterson, J. F., Sack, D. & Gabler, R. E. (2011) Physical Geography, Brooks Cole.
Scott, R. C. (1996) Introduction to physical geography, West Publishing Co, New York.
Small, R. J. (1989) Geomorphology and Hydrology, Longman, London.
Strahler, A. (2013) Introduction to Physical Geography, John Wiley & Sons, New Jersey.
Strahlar, A. N., Strahlar, A. H. (2004) Physical Environment, John Wiley, New York.
Stringer, E. T. (2004) Modern Physical Geography, John Wiley, New York.
Taylor, J. (1993) Integral Physical Geography, Longman, London.
Thornbury, W. D. (2004) Principles of Geomorphology, John Willy & Sons, New York.
Thurman, H. V. & Trujillo, A. P. (2013) Essentials of Oceanography, Prentice-Hall, Inc, New York.

Foundation-III GEOG 220 Human Geography

Objective:

This course attempts to impart knowledge about the relationship between man and environment including natural resources and related human activities.

Course outline:

- Introduction
    - Definition, scope and branches
- Basic approaches
    - Environmental determinism
    - Possibilism
    - Probabilism
    - Cognitive behaviourism
    - Coupled nature-human systems
- Population and its characteristics
    - Population distribution
    - Population structure and composition
    - Population dynamics (fertility, mortality, migration etc.)
- Economic activities
    - Classification of Economic Activities
    - Agriculture, mining, forestry, animal husbandry and poultry
    - Industries: cottage, light and heavy
    - Trade, transport and services
    - Tourism
- Settlements
    - Theories of human settlement
    - Types of settlements
    - Rural settlements
- dispersed, nucleated and Ribbon settlements
- Urban Settlements
- Urban hierarchy and functions
  Urbanization
    - Process of urbanization
    - Urban structure, morphology and theories
    - Land use and land cover patterns
- Environmental issues, causes and remedies

Field visits:

To explore economic activities in the context of natural environment of relevant area/region. To study rural and urban settlements, industrial areas and national parks.

Recommended Books:

Ahmed, Q. S. (2001) Fundamentals of Human Geography, Royal Book Company, Karachi.
Becker, A. & Secker. (2002) Human Geography: Culture, Society, and Space, John Wiley and Sons, New Jersey.
Becker, A. & Secker. (2002) Human Geography: Culture, Society, and Space, New York; John Wiley and Sons, New Jersey.
Benko, G. & Shorhmay. (2004) Human Geography: A history for the 21st century, Hodder Arnold, London.
Blij, H. J. D. (2002) Human Geography: Culture, Society, and Space, John Wiley and Sons, New Jersey.
Cloke, P. & Crang, P. (2005) Introducing Human Geographies, 2nd edition, Hodder Arnold, London.
Fouberg, E. H. (2012) Human Geography People, Place and Culture, John Wiley & Sons, Inc., Hoboken.
Getis, A. & Getis, J. (2005) Human Geography: Landscape of Human Activities, McGraw-Hill, Higher Education, Boston.
Harper, H. L. (2003) Environment and Society: Human Perspectives on Environmental Issues. Prentice Hall, New York.
Knox, P. L. & Marston, S. A. (2012) Places and Regions in Global Context: Human Geography, Prentice Hall, New York.
Lewis, C. P., Mitchell F. & Dyer, C. (2001) Village, Hamlet and Field: Changing Medieval Settlements in Central England, Windgather Press, London.
Neuwirth, R. (2006) Shadow Cities: A Billion Squatters, A New Urban World, Routledge, London.
Rubenstein, J. M. (2012) Contemporary Human Geography, PHI Learning Private Limited, New Delhi.

Foundation-IV GEOG 221 Map Work

Objective:
To train students in map drawing, reading and its use for geographical analysis
Course outline:

- Maps: its elements and types
- Principles and methods of map making, reading and reproduction
- Scale: types and their use, grid reference and indexation,
- Map projections: choice, construction, characteristics, and uses
- Enlargement and reduction of maps
- A study of the Survey of Pakistan maps
- Physical and cultural features to be described and interpreted
- Interpretation of weather maps of Pakistan

Field visits:
Visit to Survey of Pakistan and Pakistan Meteorological Departments.
Recommended Books:

Carey, H. H. (1983) How to Use Maps and Globes, Franklin Watts, New York.
Guljan, R. & Mushtaq, R. (1974) Map Projection, Oxford University Press, Oxford.
Kraak, M. J. & Ormelling, F. J. (1996) Cartography: Visualization of Spatial Data Harlow, Longman.
Robinson, A. H. (2002) Elements of Cartography, John Willey & Sons, New York.
Singh. L. & Raghunaadam, S. (1964) Map work and practical Geography, kalyani publishers, New Delhi.

Foundation-V GEOG 230 Geography of Pakistan

Objective:
This course attempts to impart knowledge about the relationship between man and physical, socio-economic and cultural environment with special reference to Pakistan, including land, population, human settlements, resources and related human activities.

Course outline:

- Introduction
- Geo-strategic position of Pakistan
    - Location and Geographical significance
    - Geo-political Importance
    - Administrative setup
- Land and Physical Environment:
    - Physiography
    - Climate and climatic regions
    - Hydrology
    - Soils and vegetation
- The People
    - Population characteristics: structure, composition and distribution
    - Population Change
    - Urbanization
- Economy
    - Agriculture (crops and livestock)
    - Irrigation
    - Power and mineral resources
    - Industries
    - Trade
    - Tourism

- Transport and Communication
- Major challenges of Pakistan
    - Water, power, security and environmental issues

Lab. Work:

Survey, data collection and presentation on different thematic maps

Field visits:

To identify various physical regions and study of at least one region's land use, urban structure, mining area, national parks, industrial areas and various rural and urban settlements and other natural resources.

Recommended Books:

Ahmad, K. S. (1978) Geography of Pakistan, Oxford University Press, Oxford.
Burkey, J. S. (1991) Pakistan the continuing search for Nationhood, Western Press Oxford, UK.
Davidson, A. P. & Ahmad, M. (2003) Privatization and the Crisis of Agricultural Extension: The Case of Pakistan, King's Soas Studies in Development Geography, Ashgate Publishing, New Delhi.
Dichter, D. (1967) Geography of N-W.F.P, Oxford University Press, Oxford.
Hameed, A. (1972) Study of the Middle Indus Basin, San Francisco State College, San Francisco.
Johnson, B.L.C (198).
Khan, F. K. (1991) Geography of Pakistan, Oxford University Press, Karachi Spate, O. H. K. (2004) India and Pakistan, Munshiram Mohoanlal Publications Pvt. Ltd., UK.
Tayyeb, A. (1973) A Political Geography of Pakistan, Oxford University Press. Oxford.

Foundation-VI GEOG 280 Land Surveying

Objective:

To train students in different surveying techniques

Course Outline:

- Introduction
- Instrumental survey and records
- Surveying using the following instruments:
    - Chain survey
    - Plane Table
    - Prismatic Compass
    - Determination of heights and slopes with Abney Level
    - Contouring by Indian Clinometer
    - Use of Dumpy level and Theodolite

- Total station
- Global Positioning System (GPS)

Field visits:

Visit to Survey of Pakistan and other concerned departments.

Lab. Work:

Preparation of the practical note book is mandatory.

Recommended Books:

Carey, H. H. (1983) How to Use Maps and Globes, Franklin Watts, New York.
Clendinning, J. (1970) Principles of Surveying. Blackie and Sons, New Jersey.
Chandra, A. M. (2006) Plane Surveying, New Age International, 2nd edition, New Delhi.
Duggal, S. K. (2004) Surveying: Volume-II, Tata McGraw-Hill, New Delhi.
El-Rabbany, A. (2006) Introduction to GPS: The global Positioning System, 2nd edition; Artech House, Boston.
Gopi, S., Kumar, S., & Madu, R. N. (2007) Advanced Surveying: Total Station, GIS and Remote Sensing, Delhi.
Guochang, X., (2007) GPS: Theory, Algorithms and Applications, 2nd edition, Springer, New York.
Kaplan, (Ed.) (2006) Understanding GPS: Principles and Applications. Artech House, London.
Kennedy, M. (2010) The Global Positioning System in ArcGIS, Tyler and Frances Group, New York.
Kumar, P. (2007) Dictionary of Global Positioning System, Biotech Books, Delhi.
Mc Cormac, J. (2004) Surveying, New York, John Willey & Sons, 5th edition.
Roy, S. K. (2010) Fundamentals of Surveying. Ph I learning Prinate Limited, New Delhi.
Taylor, G. & Blewit, G. (2006) Intelligent Positioning: GIS-GPS Unification. John Wiley & Sons, New Jersey.

Foundation-VII GEOG 281 History & Development of Geographic Thought

Objectives:

To study the evolution of geographic thought and concepts.

Course outline:

- Nature of Geography
- Evolution of Geography
  - Pre-classical and classical periods: ancient Geography

- Medieval Geography: Muslim contributions, European contributions.
- Modern Geography: Humboldt and Ritter, Geography from the middle of the 20th century, Dichotomies-physical and human, systematic and regional. Quantitative Revolution, Geo-informatics and Ecology.

- Established traditions: Earth science, area study, spatial organization, man-land, system analysis and cartographic science.
- Man-environment interaction themes: Environmental Determinism, Possibilism, Probabilism, Cognitive Behaviourism, World views on man-environment relationship.
- Development of Nomothetic traditions: facts, concepts, hypotheses and paradigms, Ideographic vs. Nomothetic.
- Philosophical framework: Positivism: Pragmatism, Phenomenology
- Evolution of modern tools and models in geography
- Development of geography in Pakistan

Lab. Work:

Writing of assignments and construction of maps relating to geographical thought and seminar presentation**.**

Recommended Books:

Creswell, T. (2013) Geographic Thought: A critical Introduction, Wiley-Blackwell, Oxford.
Clayton, K. & Johnson, J.H. (Ed.), (1988) Aspects of Geography, Macmillan, London.
Dickinson, R. E. (1969) The Makers of Modern Geography, Routledge, London.
Dickinson & Howarth, O.J.R. (1933) The Making of Geography, The Clarenden Press, Oxford.
James, P. E. & Mailim G. J. (1981) All Possible Worlds, John Wiley & Sons, New York.
Johnston, R. J. (1983) Geography and Geographers, Edward Arnold, London.
Kenzer, M. S. (Ed.) (1989) On Becoming a Professional Geographer Columbus, Merril Publishing Co., UK.
Mayhew, S. (1986) Geography, Harmonds Worth: Penguin London
Mitchel, B. (1989) Geography and Resources Analysis, Longman, New York.
Tim, U. (1992) The Place of Geography, Longman, London.
Unwin, D. (1989) Introductory Spatial Analysis, Methuen, New York.

Foundation-VIII GEOG 381 Principles of Cartography

Objective:

To familiarise students with map-making science and its applications.

Course outline:

- Evolution of Cartography
- Basic geodesy, spherical, ellipsoidal and geoidal earth, geographical and planer coordinates, properties of the graticule and geodetic position.
- Map projections: Major types, merits and demerits of commonly used map projections.
- Map Datum
- Symbolization, symbol types and graphic variables, the symbolization problems, symbolizing graphic features.
- Lettering principles.
- Mapping statistical surfaces: Thematic map, choropleth, dot map, isolines, area cartograms.
- Principles of cartographic design, general design problems; design of map symbols. Basic procedure and designing of the thematic maps such as topographic, climatic, economic, population, settlements, urban morphology etc.
- Map production, form of map output, construction material, output options, composing separations, proofing.
- Introduction to Digital Cartography
- Terrain data (Digital Elevation Model/ Digital Terrain Model)

Lab. Work:

Drawing of various thematic maps and other relevant exercises in cartography and mapping.

Recommended Books:

Bygot, J. (1960) An Introduction to Map Work & Practical Geography, Tutorial Press, London.
Campbell, J. B. (2010) Introduction to Remote Sensing, The Guilford Press, London.
Clarke, K. (2010) Getting started with Geographic Information System, Prentice Hall, New York.
Foresman, T. (1997) The history of Geographic Information System, Prentice Hall, New York.
Grampton, J. W. (2010) Mapping: A critical introduction to Cartography & GIS. John Wiley & Sons, New York.
Heywood, I. C. S. & Carver, S. (2003) An introduction to Geographic Information System, Addison Wesley Longman, New York.

McDonald, R. & Burrough, P. (2001) Principles of Geographic Information Systems, Oxford University Press, Karachi.
Maguire, D. J. (1991) Geographic Information System. Longman, London.
Mather, P. M. (2004) Computer Processing of Remotely Sensed Images, John Wiley and Sons, New Jersey.
Robinson, A. N., Morrison, J. L., Muehrcke, P.C., Kimerling, A. J., & Guptill, S.C. (2002), Elements of Cartography, John Wiley, New York.

Major-I GEOG 311 Geomorphology

Objectives:
To make students understand the origin and recognize different types of landform with the help of shape, material and process.

Course outline:

- Scope and status of geomorphology
- Introduction to geomorphic concepts/principles
- Factors of landform development; structure, process and geological time scale
- Endogenic Processes
  - Isostasy
  - Diastrophism
  - Continental drift
  - Plate tectonic
  - Volcanism
  - Earthquakes
- Exogenic Processes
  - Weathering; mass wasting and their types
- Cycle of erosion: fluvial , glacial, eolian and Karst
- Fluvial erosional landforms, transportation mechanisms of running water; fluvial depositional landforms, types of drainage patterns and structure
- Glacier formation, glacier as geomorphic agent: glacial erosion and depositional landforms; glacio-lacustrine and glacio-fluvial features
- Eolian landforms: wind as geomorphic agent; eolian erosional landforms, transportation by wind; Eolian depositional landforms
- Ground water: porosity and permeability of rocks; aquifers
- Karst topography and associated landforms
- Sea wave as geomorphic agent; erosional and depositional landforms
- Soil development: factors of soil formation, physical and chemical properties of soil, soil profile, texture and structure; types of soils

Lab. Work:

Lab. work must be conducted for soil, rocks and minerals recognition where relevant material is readily available. Geomorphic profiles, use of Remote

sensing techniques for the interpretation of landforms and geomorphic features

Field Visit:

Field trips to accessible areas for in-depth geomorphic studies.

Recommended Books:

Burbank, D. W. & Anderson, R. S. (2011) Tectonic Geomorphology: A Frontier in Earth Science, Blackwell Science, New Jersey.
Charlton, R. O. (2008) Fundamentals of Geomorphology, Routledge Taylor & Francis Group, London.
Clarke, J. I. (1958) The Study of Soils. Oxford University Press: Oxford.
Dury, G. H. (1960) The Face of the Earth. Penguin Books. London.
Hagget, R. J (2011) Fundamentals of Geomorphology, Routledge, London.
King, C. (1976) Techniques in Geomorphology. Edward, London.
Leopold, L. B., Wolman, M. G. & Miller, J. P. (1995) Fluvial Processes in Geomorphology, Dover Publications, UK.
Ritter, D. F., Kochel, R. C. & Miller, J. R. (2011) Process Geomorphology, McGraw-Hill, New York.
Russels. (1959) The World of Soils, Collins Books, London.
Spark, B .W. (1986) Geomorphology, Longmans, London /New York.
Summerfield, M. (1996) Global Geomorphology, Prentice Hall Inc., New York.
Thornbury, W. D. (2004) Principles of Geomorphology, John Wiley & Sons, London .
Wooldridge, S. W. & Morgan, R. S. (2009) An Outline of Geomorphology: The Physical Basis of Geography. Longmans. London /New York.

Major-II GEOG 312 Climatology

Objectives:

To understand the elements and factors of climate, spatial and temporal variations in weather and climate.
To familiarise students with the major climatic regions of the world and Pakistan.

Course outline

- Introduction.
- Key concepts in climatology and meteorology.
- Structure and composition of atmosphere.
- Elements and factors of climate.
- Insolation and Terrestrial heat budget.
- Temperature distribution.
- Humidity and its types; Condensation and their forms, Precipitation, formation and their types.

- Atmospheric Pressure and global pressure belts.
- Atmospheric Circulation: (Upper and Lower) air stability and instability, storms; Cyclones (hurricanes, typhoons) and tornadoes
- Air masses and fronts.
- Classification of climates; critical study of the Koppen, Miller and Thornthwaite classifications of major climates.
- Climate variability and climate change: Natural and anthropogenic; Green house gasses; global warming; acid rain, ozone layer depletion El-Niño and La-Niña, impact on precipitation distribution.
- Climatic regions of Pakistan and their characteristics
- Climatic data: sources, collection, analysis and presentation. Problems associated with data quality (spatial, temporal).

Lab. Work:
Recording and analysis of weather data, interpretation of weather maps and synoptic charts. Visit to local office of Pakistan Meteorological Department and hands on exercises.

Recommended Books:

Ackerman, S. A. (2012) Meteorology: Understanding the atmosphere, Jones & Bartlett Learning, Canada.
Ahrens, C. D. (2009) Meteorology Today, Brooks/Cole CENGAGE learning, Australia.
Barry. R. (2009) Atmosphere, Weather and Climate, Clays St. Davis., London.
Byers, H. R. (1991) General Climatology, Prentice Hall, New Delhi.
Byers, H. R. (1993) General Meteorology, McGraw-Hill, New York.
Graedel, T. (1995) Atmosphere, Climate and Change, Scientific American Library, New York.
Haurwitz, B. & Austin, J. (1944) Climatology, McGraw Hill, New York.
Kendrew, W. G. (1959) Climatology, University Press Oxford, Karachi
Lutgens, F. K. & Edward, J. T. (2012) The atmosphere: An introduction to Meteorology, PHI learning, New Delhi.
Lamb, H. (1992) Climate History and the Modern World, Methun & Co. Ltd., London.
Maclleveen, J .F. (1991) Fundamentals of Weather and Climate, Chapman & Hall, London.
Miller, A. (2001) Climatology, Methuen, New York.
Oliver, J. (1981) Climatology: Selected Applications, Edward Arnold, USA.
Sellers, A. & Henderson, A. (1986) Contemporary Climatology, Longman, London.
Shamshad, K. M. (1988) The Meteorology of Pakistan, Royal Book Co., Karachi
Shapley, H. (1960) Climatic Change, Evidence, Causes & Effects, Harward University Press, Cambridge.

Thompson, R. (1997) Applied Climatology, Principles and Practice, Routledge, Canada.
Trenberth, K. (1992) Climate System Modelling, McGraw-Hill, New York.
Trewartha, G. T. (1996) Climate System Modelling, McGraw, New York.
Whyte, I. (1999) Climatic Change and Human Society, Arnold Division, London

Major-IV GEOG 314 Oceanography

Objective:

To develop a comprehension of the origin of oceans, geomorphology, circulation and resultant physical characteristics of the oceans among the students.

Course outline:

- Introduction
- Origin of oceans and seas: major water masses and their distribution.
- Morphology of the ocean basins.
- Ocean floor deposits, their characteristics and classification.
- Temperature, salinity and density of ocean water; distribution, causes and effects
- Oceanic circulation: waves, currents and tides, their nature, causes, effects and impact on environment.
- Special phenomena: tropical storms; Tsunami.
- Oceanography of Arabian Sea with special reference to Exclusive Economic Zone.

Lab. Work:

Drawing features of the Ocean floor, mapping of the ocean currents, tides and associated phenomena.

Field visit:
Visit to any coastal area to study the various coastal morphological features.

Recommended Books:

Garrison, T. (2005) Oceanography: An invitation to Marine Sciences, Thomson Brooks/Cole, Australia.
Murry. (2000) The Ocean, McGraw-Hill, New York.
Thurman, H. V. & Trujillo, A. P. (2010) Essentials of Oceanography. Prentice Hall, Canada.
Thurman, H. V. (2003) Introductory Oceanography. Prentice Hall, Canada

Foundation-IX GEOG 382 Quantitative Methods in Geography

Objectives:

To train students in collection, analysis, interpretation and presentation of quantitative spatial data and to enable them to organize and conduct independent research
To use database software for the analysis of both Spatial and Temporal data

Course outline:

- Introduction
- Quantitative revolution and its impact on Geography
- Parametric and non-parametric statistics
- Nature of geographical data and measurement scales.
- Data summarizing techniques: theory of central tendency, dispersion, and variability.
- Time Series: graphs, growth and decline, index numbers, logarithmic scales, trends and fluctuations, components of time series.
- Methods of drawing trend lines for linear and exponential series scatter diagrams, standard errors and probability, correlation and regression.
- Quantitative models in Geography

Lab. Work:

Introduction to EPI-Info SPSS E-view, MS Excel, MiniTab and other relevant software database for quantitative analysis.

Recommended Books:

Haring, L. L. (2002) Introduction to Scientific Geographic Research, Oxford: ECB Levin, J. (2006) Elementary Statistics in Social Research, Pearson, New Delhi.
Maguire, D. J. (1989) Computers in Geography, London: Longman.
Matthew, H. & Foster, I. (1991) Geographical Data. Sources, Presentation and Analysis, Oxford University Press: London.
Mckillup, S. & Melinda, D. D. (2010), Geostatistics Explained, Cambridge University Press, Cambridge.
Walford, N. (2011) Practical Statistics for Geographers and earth Science, Wiley- Blackwell, Singapore.

Foundation-X GEOG 383 Environmental Geography

Objective:

To impart basic environmental knowledge to the students and enhance their awareness regarding global and local environmental issues.

Course outline:

- Introduction
- Evolution of Environmental Studies in Geography
- Comparative Advantage of Geography
- Concept of environmental management
- Environment and Man
    - Ecosystem
    - Resources
    - Important Cycles
    - Population explosion
    - The human impact on the environment
    - Environmental hazards
- Types of Hazards
- Geophysical
- Quasi-Natural
- Biological
- Technological
- Human Response Parameters
- Risk assessment and perception
- Adjustment to Hazards
- Major Environmental hazards and Problems in Pakistan:
    - Floods
    - Earthquake; Tsunami
    - Cyclones
    - Landslides
    - Droughts
    - Deforestation and Desertification
    - Water-logging and Salinity
    - Soil Erosion
    - Global Warming and ozone depletion
    - Environmental Pollution
    - Waste Management
- Control and Mitigation Measures
    - Technology
    - Awareness
    - Legislation
    - Ethics
    - Pakistan Environmental Act
    - National Conservation Strategy
    - National Environmental Quality Standards

Lab. Work:
Field visits of urban and rural areas to identify local environmental problems and documentation of these problems through GIS and SRS data

Recommended Books:

Arms, K. (1991) Environmental Science, Asunders College Publishing: Philadelphia.
Basak, A. (2009) Environmental Studies, Pearson, New Delhi.
Botkin, D. B. & Edward A. K. (2012) Environmental Science, John Wiley & Sons. Inc., Hoboken.
Burton, I. R., W. Kates & Gilbert. F. W. (1978) The Environment as Hazard, Oxford University Press, Karachi.
Cunningham, W. P. (2007) Environmental Science: A Global Concern, McGraw-Hill Higher Education, Boston.
Dasgupta, S. (Ed.) (2009) Understanding the Global Environment, Pearson Longman, New Delhi.
Enger, E. D. (2004) Environmental Science, McGraw-Hill Higher Education, London.
Freedman, B. (1998) Environmental Science: A Canadian perspective, Scarborough Prentice Hall: Canada.
Goude, A. (1986) The Human Impact on the Natural Environment, Basil Blackwell, Oxford.
Greenburg, M. R. (1978) Environmental Impact Statement, Resource Paper No. 78-3, Association of American Guha, R. (2000) Environmentalism: A global history, Longman, New York, pp. 69 – 97, http://hdr.undp.org/en/. Geographers, Washington, DC.
Kjellstrom, T. (1988) Health Hazards of the Environment: Measuring the Harm, World Health, pp. 2-5.
Lackey, R. T. (2005) Economic growth and salmon recovery: an irreconcilable conflict, Fisheries 30(3): 30-32.
Lead, J. R. & Smith, E. (2009) Environmental and human health impacts of nanotechnology. John Wiley & Sons, New York**.**
Marsh, W. M. & John, G. (2005) Environmental Geography, John Wiley & Sons, Inc. Hoboken.
Raven., Peter, H. & Linda R. B. (2004) Environment, John Wiley & Sons, Inc., Hoboken.
Singh, L. (2010) Environmental Geography. A.P.H. Publishing Corporation.
Slocombe, S. (2004) Applying an Ecosystem Approach' in B. Mitchell: Resource and Environmental
Stokstad, E. (2005) Taking the pulse of Earth's life support systems, Science, 308, 41 – 43.
United Nations (2009) Sustainable Agriculture and Food Security in Asia and the Pacific. United Nations Publications. Water International 25(1), 127 – 138
Weng, Q. (Ed.) (2011) Advances in Environmental Remote Sensing, Taylor and Francis Group, Boca Raton.

Wright, R. T. (2008) Environmental Science, Pearson Prentice Hall, New Delhi
Bennet, R. & Estall, R. (1991) Global Change and Challenges: Geography for the 1990s, Routledge: London.

Major-V GEOG 321 Economic Geography

Objective:

To create an understanding of Spatial variations of Economic resources and activities with reference to global and national scenarios.

Course outline:

- Introduction
- Evolution of world economic systems: Medieval feudal economics, economic impacts of colonialism. Modern world economic systems
- Concept of natural resources and reserves
- Human resource and its development
- Classification of economic activities
- Primary activities; gathering, hunting, herding, subsistence, Intensive and extensive farming, commercial grain farming, livestock farming, dairying, mixed farming, plantation farming, lumbering, fishing and mining
- Green revolution and its implications
- Secondary activities: Industrial revolution and manufacturing industries
- Tertiary activities
    - Trade and service functions
    - Transport systems.
- Quaternary and Quinary activities
- Regional inequalities, sustainable development and poverty alleviation
- Impacts of Globalization

Lab. work:

Collection and presentation of data from Economic Survey of Pakistan, Agricultural Statistics of Pakistan etc. pertaining to economic activities on maps with the help of different cartographic methods.

Recommended Books:

Aoyama, Y., James T. M. & Susan H. (2012) Key Concepts in Economic Geography, SAGE, Singapore.
Alnwick, H. (2012) A Geography of Commodities, Harrap, London.
Hartshorne, T. A. & Alexander J. W. (1988) Economic Geography, Prentice Hall, Inc. Englewood Cliffs, New York.

Jarrett, H. R. (1969) Geography of Manufacturing, MacDonald & Evans Ltd. London.
Jones, C. F. & Darken. (1965) Economic Geography, Macmillan New York.
Khan, F.K. (1998), An Introduction to Economic Geography. Oxford Publishers, Karachi.
Knox, P & Agnew, J. (2008), The Geography of the World Economy. , Edward Arnold, London.
Luckas, M. R. (1991) Economic Activity., Longman group, UK Limited
Sadhukhan, S. K. (1986) Economic Geography, An Appraisal of Resources, S. Chand and Company Ltd., New Delhi.
Smith, J. R., Phillips, M. O. & Smith, T. S. (2013) Industrial and Commercial Geography. Hott, Rinehart and Winston, New York.
Thoman, C. & Yeats. (1988) The Geography of Economic Activity, McGraw-Hill Book Company, New York, Inc
Thomes, R. S. & Hagget, R. J. (1980) Models in Geography. Harper and Row Publishers, London.
Truman, A. & Jhon, W. A. (1992) Economic Geography. Prentice-Hall of India.
Williams, T. R. (1991) Economic Geography., Longman group, New York.

Major-VI: GEOG-390 Research Methods

Objective:

To create awareness among students regarding basics of geographical research

Course outline:

Introduction
Research approaches

- Research paradigms in Geography
- Types of research: historical research, qualitative/descriptive research, quantitative/experimental research
- Research design; research topic, formulation and statement of a problem, research questions, research hypotheses, research objectives, research plan
- Literature review; Literature sources: Journals (types) Books, Monographs and web sources
- Data collection, universe and sampling: primary and secondary data, sources of data
- Selection of a sample and measuring instruments, basic considerations in sampling, size of sample, geo-statistical
- considerations, Sampling units and design; points, traverses, random sampling, stratified sampling, systematic sampling
- Field Techniques
- Data analysis and interpretation: pre-analysis considerations,

preparing data for analysis: use of the descriptive statistics and quantitative methods.

- Data presentation
- Research report writing; Proposal and Synopsis writing
- Bibliography and references

Lab. Work:

Preparation of Research presentations with the help of software (end note, reference manager etc).

Recommended Books:

Ackerman, E. A. (1958) Geography as a Fundamental Research Discipline, University of Chicago Press, Chicago

Baker, A. R. H. & Billinge, M. (2011) Period and Place: Research Methods in Historical Geography. Cambridge University Press.

Blaxter, L., Hughes, C. & Tight, M. (2010) How to Research, Tata, McGraw-Hill Higher Education, New Delhi.

Bordens., Kenneth, S. & Bruce B. (2011) Research Design and Methods, McGraw-Hill, Singapore.

Bridget, S. & Lewin, C. (Ed.) (2012) Theory and Methods in social Research, SAGE, London.

Cohen, L., Manion, L. & Morrison, K. (2011) Research Methods in Education, Routledge Taylor & Francis Group, London.

Ebdon, D. (1977) Statistics in Geography, Basil Blackwell, Oxford.

Gee, W. (1950) Social Science Research Method, Appleton Century Crofts, Inc. New York.

Gomez, B. & Jones, J. P. (Ed.) (2010) Research Methods in Geography: A Critical Introduction, Wiley-Blackwell, UK.

Gregory, S. (1973) Statistical Methods and the Geographers, Longman, London.

Gupta, M. & Gupta, D. (2011) Research Methodology, PHI learning, New Delhi.

Hammond, R. E. (1978) Quantitative Techniques in Geography, Clarendon Press, Oxford Howard.

Hoggart, K., Lees, L. & Davies, A. (2002) Researching Human Geography, Arnold Publishers, London, 1st Edition.

Huff, D. (1973) How to Lie with Statistics, Hammonds-worth, Penguin, New York.

Jackson, S. L. (2011) Research Methods: A Modular approach, Wadsworth, Australia.

K. & Sharp, J A. (1983) The Management of a Student Research Project, Gower Publishing Company, UK.

Keelinger, F. N. (1986) Foundation of Behavioural Research, CAB Publications. Kumar, R. (2011) Research Methodology, SAGE, New Delhi.

Leary, Z. (2010) The essential Guide to doing your Research Project, SAGE, New Delhi.
Montello, D. & Sutton, P. (2012) An Introduction to Scientific Research Methods in Geography & Environmental Studies. SAGE Publications, London.
Norcliffe, G. B. (1977) Inferential Statistics for Geographers, Hutchins, London.
Plate, R. S. (1959) Field Study in American Geography, University Press Chicago, Illinois Taylor, P. J. (1977) Quantitative Methods in Geography, Houghton Mifflin, Boston.
Walker. (1963) The Nature of Scientific Thought, Prentice Hall, New Jersey.

Major-VII GEOG Regional Concepts

Objective:

This course is framed to impart knowledge of the principles underlying the division of the world into geographic regions & to transfer knowledge of the characteristics of regions at global level

Course Outline:

- **Introduction to Regional Concepts**
    - Scope, Status, and the significance of the regional approach
    - Regional approach and its evolution
    - Criteria for dividing world into regions
- Physical Attributes: Location, Physiography, Climate, Soils, Hydrology and Natural Vegetation
- Economic attributes: Human Resources, Mineral and Power esources, Agriculture, Industry, Communication and Trade
- **Types of Regions**
    - Physical Regions
    - Economic Regions
    - Political Regions
    - Cultural Regions
    - Special Purpose Regions
- **Major Regions of the world**
    - Distinguishing characteristics
    - South Asia
    - South West Asia
    - Far-eastern regions
    - Western Europe
    - Russia and Central Asia
    - North Africa and Anglo-America
    - Other Regions
- **Role of the Region in Global Development**

Lab. Work:

Identification and delimitation of different types of regions on maps.

Recommended Books:

Bradshaw, M. & White, G. W. (2007) Contemporary World Regional Geography: Global connections, local voices, McGraw-Hill Higher Education. Boston.
Deblij, H. J. D & Muller, P. O. (2011) The world Today: Concepts and Regions in Geography John Wiley & sons Inc., New York.
Hobbs, J. (2010) Fundamentals of World Regional 2nd edition, Cole Cengage learning: Australia.
Knox, P. L. & Marston, S. A. (2003) Places and Regions in Global Context: Human Geography, Prentice Hall, New Jersey.
James. & Preston, E. (1974) One World Divided Prentice Hall, New Jersey.
James. & Jones. (1965) American Geography; Inventory and Prospects. Association of American Geographers. USA
Singh, R. L. (2008) Fundamentals of Human Geography, Sharada Pustak Bhawan, Allahabad.
Swawy, M. C. K., Bhaskara, R. & Hegde, V. M. (eds.) (2008) Urban Planning and Development at Cross Roads, BC books for Change, Bangalore.

Major-VIII GEOG 371 Geographical Information System

Objective:

The course aims to equip students with an understanding of GIS, evolution and applications of spatial data through Geo-spatial technologies.

Course outline:

- **Introduction:**

  Definitions, key components, functional subsystem,
  Raster data model, vector data model, attribute data model,
  Data acquisition techniques, data sources, data capturing techniques and procedures, data transformation, visualization of spatial data, layers and projections and datums

- **Map design:** symbols to portray points, lines, polygons and volumes, graphic variables, visual hierarchy, Data classification graphic approach, mathematical approach.

- **Spatial analysis**: neighbourhood functions, network, and overlay analysis, buffering, spatial data quality: components of data quality, micro level components, macro level components, usage components, sources of errors, accuracy and resolution and uncertainty.
- **GIS Applications**

Lab. Work:

Introduction to GIS Lab (hardware/ software), Raster/ Vector/ Attribute Data Display, Scanning, Digitization, coordinate based point mapping, Raster/ Vector Conversion, Data layer integration and display of different projections, Map layout, Data Classification and Thematic Mapping, Handling of Topological Errors, Overlay and network analysis.

Recommended Books:

Aronoff, S. (2004) Geographic Information Systems, A Management Perspective WDL Publications, Ottawa.

Burrough, P. (2002) Principles of Geographic Information Systems for Land Resources Management., Oxford University Press, Oxford

Bygot, J. (1960) An Introduction to Map Work & Practical Geography, Tutorial Press, London.

Campbell, J. B. (2002) Introduction to Remote Sensing, The Guilford Press, New York

Carey, H. H. (1983) How to Use Maps and Globes, Franklin Watts, New York.

Clarke, K. (2004) Getting started with Geographic Information System, Prentice Hall , New York.

Demers, M.N. (2008) Fundamentals of Geographical Information Systems. Fourth Edition. John Wiley & Sons, New Jersey.

Foresman, T. (1997) The history of Geographic Information System, Prentice Hall, New York.

Heywood, I., Cornelius, S., & Carver, S. (2011) An Introduction to Geographical Information System, Fourth Edition. Prentice Hall, New Jersey.

Jensen, J. R. (2006) Remote Sensing of the Environment: An Earth Resource Perspective. Second Edition, Prentice Hall, New Jersey.

Kimerling, J., Buckley, A. R., Muehrcke, P. C., & Muehrcke, J. O. (2011) Map Use: Reading, Analysis, Interpretation. Seventh Edition. ESRI Press. USA.

Krygier, J., & Wood, D. (2011) Making Maps: A Visual Guide to Map Design for GIS. Second Edition. The Guilford Press, New York.

Lillesand, T. M. & Kiefer, R. W. (2004) Remote Sensing and Image Interpretation, John Wiley and Sons, New Jersey.

Longley, P. A., Goodchild, M., Maguire, D. J. & Rhind, D. W. (2010) Geographic Information Systems and Science. Third Edition. John Wiley& Sons, UK.

Maguire, D. J. (1991) Geographic Information System, Longman, London.

Mather, P. M. (2004) Computer Processing of Remotely Sensed Images, John Wiley and Sons, New Jersey.

McDonald, R. & Burrough, P. (2001) Principles of Geographic Information Systems, Oxford University Press, Oxford.

Monkhouse, F. J. & Wilkinson, H. R. (1994) Maps and Diagrams, , Methuen, London.

Nathanson, J. A., Lanzafama, M., & Kissam, P. (2010) Surveying Fundamentals and Practices. Sixth Edition. Prentice Hall, New York.
Riasz, E. (1979) General Cartography, , McGraw Hill, New York
Robinson, A. N. (1995) Elements of Cartography, , John Wiley, New York
Robinson, A. N. (1979) An Introduction to the Study of Map Projections. University of London Press, London.
Slocum, T. A., McMaster, R. B., Kessler, F. C. & Howard, H. H. (2008) Thematic Cartography and Geo visualization. Third Edition. New York.

Major-IX GEOG 372 Remote Sensing

Objectives:

- To introduce knowledge of recording earth's surface features from space-borne platforms and different ways in which images can be analysed.
- To enable students to develop an understanding of common remote sensing products such as, earth resources satellite images, aerial photographs etc.
- To develop a comprehension regarding ground-truthing aided by GPS

Course Outline:

- Introduction
- History and Development
- Concepts and Foundation of Remote Sensing
  - Electromagnetic spectrum
    - Visible Spectrum
    - Colour Theory
    - Atmospheric Attenuation
  - Types of Remote Sensing Systems
    - Active Remote Sensing
    - Passive Remote Sensing
- Type of Sensors
  - RBV, MSS, TM,HRV, HRPT/APT/AVHRR, MODIS (Terra and Aqua) non-imaging systems (RADAR)
- Types of Satellites
  - Manned Satellites (Gemini, Mercury, Apollo, Space Shuttles)
  - Unmanned Satellites (Metrological, Earth Resources, Telecommunication, Spy, Scientific etc.)
  - Platforms (Orbits)
  - Ground Receiving Stations (Reception of Data)
  - Image Processing
  - Image Classification

- Image Interpretation
  - Image Interpretation Methods
  - Image Interpretation Elements
  - Image Interpretation Tasks
  - Image Measurements
- Global Positioning System (GPS)
- Applications (Hydrology, Geology, Climatology, Environmental Application, Planning, Agricultural, Forestry, Socio-economic, Health etc.)
- Remote Sensing in Pakistan: Potential and Prospects

Lab Work:

Introduction to labs., single band image interpretation, false color predictions, false color composite images interpretation, visual interpretation of aerial photographs, various sensors data comparison, thermal infrared image interpretation, introduction to ERDAS imagine, display, geo-linking, identification of targets, field trips.

Recommended Books:

Aber, J. S., Marzol, F. I., & Ries, J. (2010) Small-Format Aerial Photography: Principles, Techniques and Geoscience Applications, Elsevier, Amsterdam.
Aronoff, S. (2004) Geographic Information Systems, A Management Perspective, WDL Publications, Ottawa.
Bossler, J. D. (Ed.) (2010) Manual of Geospatial Science and Technology, CRC Press Taylor & Francis Group, Boca Raton.
Burrough, P. (2002) Principles of Geographic Information Systems for Land Resources Management, Oxford University Press, Oxford.
Campbell, J. B. & Wynne, R. H. (2011) Introduction to Remote Sensing. Fifth Edition. Guilford Press, New York.
Carey, H. H. (1983) How to Use Maps and Globes, Franklin Watts, New York.
Foresman, T. (1997) The History of Geographic Information System, Prentice Hall, New York.
Heywood, I., Cornelius, S. & Carver, S. (2003) An introduction to Geographic Information System, Addison Wesley Longman, New York.
Iliffe, J. & Lott, R. (2008) Datums and Map Projections for Remote Sensing, GIS, and Surveying. Second Edition. Whittles Publishing, UK.
Jensen, J. (2000) Introductory Remote Sensing: Principles and Concepts, Freeman & Co., New York.
Jensen, J. R. (2011) Remote Sensing of the Environment: An Earth Resource Perspective. Second Edition. Prentice Hall, New Jersey.
Kraak, M. J. (1996) Cartography: Visualization of Spatial Data, Longman, Harlow.

Lillesand, T. M., Kiefer, R. W. & Chipman, J. W. (2007) Remote Sensing and Image Interpretation. Sixth Edition. John Wiley and Sons., New Jersey.
Maguire, D. J. (1991) Geographic Information System, Longman, London.
Mather, P. M. (2004) Computer Processing of Remotely Sensed Images, John Wiley and Sons, New Jersey.
McDonald, R. & Burrough, P. (2001) Principles of Geographic Information Systems, Oxford University Press, Oxford.
Reddy, M. A. (2008) Textbook of Remote Sensing and Geographical Information System. Third Edition. BS Publications, Hyderabad.
Richard, J. A. & Xiuping, J. (2006) Remote Sensing Digital image Analysis, Springer, Australia.
Robinson, A. N. (1979), An Introduction to the Study of Map Projections, University Press London, London.
Sabins, F. F. (2007) Remote Sensing: Principles and Interpretation. Third Edition. Waveland Press, Long Grove, Illinois.
Weng, Q. (2010) Remote Sensing and GIS Integration: Theories, Methods and applications, McGraw-Hill, New York.
Wolf, P., DeWitt, B. & Wilkinson, B. (2012) Elements of hotogrammetry with Application in GIS. Fourth Edition. McGraw-Hill, New York.

Major XGEOG 491 Research Project (Thesis)

- **Introduction**
    - Background
    - The Problem
    - Research Questions
    - Hypothesis
    - Objectives
    - Significance
    - Historical Context
- **Methodological Framework**
    - Data Sources
    - Data Quality
- **Data Uncertainty and Limitations**
    - Methods
        - Techniques
        - Models
        - Sampling
        - Accuracy Assessments
        - Qualitative data (Questionnaire)
        - In-situ Observation (Field Records)
- **Review of Literature**

- General
- Issue Specific
- Technique Specific

- **Results & Discussion**
- **Conclusion**
  - Suggestions/Recommendations
- **References**
- **Annexure**

Major-XIGEOG492 Internship

Objective:

To expose students to do practical work in a real world situation to bridge the gap between theory and practice by writing a report independently. Learn communication skills by presenting it in a seminar.

Internship project outline:

Internship with any public, private sector, district governments, national /international organization, inter university linkages, academic and research institutions, NGO, CBO, CCBs or Group Survey with report and its presentation in a seminar.

Elective322 Settlement Geography

Objectives:
To explain the process of formation and development of human settlements
To enable students to develop an understanding regarding the processes of urbanization.
Course outline:

- Introduction
- Significance of settlement geography, basic definitions: Site and situation, hierarchy and types of settlements
- Rural settlements: Dispersed settlements, nucleated and ribbon settlements; their contrasts between More Developed Countries (MDCs) and Less Developed Countries (LDCs)
- Forms and patterns of settlements, house types and their evolution in rural areas
- Commercial functions of rural settlements and their role as a market town
- Infrastructure and services in rural settlements.
- Historical evolution of urban settlements, western and non-western urbanization, rural-urban fringe, suburbs and satellites
- Economic base, urban function and functional classification

- Towns and villages as central places
- Internal structure of the cities and land use pattern
- Theories of urban structure: Concentric Zone theory, Sector theory, Multiple Nuclei theory, and social area analysis,
- Urban development: slums and blighted areas.
- City-size, distribution, rank-size rule, primate city

Lab. Work:

Analysis of settlement types from topographic sheets, their centrality as population foci, urban areas etc.

Field Visit:

Field trips to study land use of major cities in Pakistan.

Recommended Books:

Chisholm, M. (1982) Rural Settlements and Land use, Hutchinson University Library, London.

Gerald, B. (1966) Urbanization in Newly Developing Countries, Prentice Hall, London.

Gottdiener, M. & Budd, L. (2005) Key concepts in Urban Studies. SAGE Publications, London.

Gupta, K. R. (2004) Urban Development debates in the new Millennium, Vol.4, Atlantic Publishers, New Delhi.

Hall, T. & Barrett, H. (2012) Urban Geography, Routledge, Taylor & Francis Group, London.

Hudson, F. S. (1970) Geography of Settlement. Macdonald & Evans, London.

Knapp, B. (1986) Systematic Geography, Allen & Unwin, London.

Larice, M. (Ed.) (2013) The Urban Design Reader, Routledge, Taylor & Francis Group, London.

LeGates, R.T. (Ed.) (2011) The city Reader, Routledge Taylor and Francis Group, London.

Lewis, C. P., Mitchel, F. & Dyer, C. (2001) Village, Hamlet and Field: Changing Medieval Settlements in Central England. Windgather Press, England.

Macionis, J. J. & Parrillo, V. N. (2011) Cities and Urban life, PHI learning, New Delhi.

Mayer, H. M. & Kohn, C. F. (1959) Readings in Urban Geography, University of Chicago Press, USA.

Michael, P. (2002) Urban Geography. A global prospective, Rutledge, New York.

Murphy, R. E. (1966) The American City: An Urban Geography. McGraw Hill, New York.

Neuwirth, R. (2004) Shadow Cities: A Billion Squatters, A New Urban World, Rutledge, New York.

Pacione, M. (2009) Urban Geography-A Global Perspective. Third Edition. Routledge, London
Rennie, J. & Short, P. (1992) Human Settlement (Illustrated Encyclopaedia of World Geography, Oxford University Press, Oxford.
Robert, B. K. (1996) Landscapes of Settlements: Prehistory to Present, Rutledge, London Rykwert, J. (2004) Settlements, University of Pennsylvania Press, University Park, USA.
Sidhartha, K. & Mukherjee, S. (2000) Cities-Urbanizations & Urban Systems. Kisalaya Pub. Pvt. Ltd., New Delhi.
Theriault, M. (Ed.) (2011) Modeling Urban Dynamics, John Wiley and Sons, Inc., London.
United Nation Development Programme, (1996) Living in Asian Cities, ST/ESCAP/1660 United Nations, New York.
United Nation Centre Of Human Settlement (1996) An Urbanizing World: Global Report on Human Settlements. Oxford University Press, Oxford.
Wood, M. (2005) Rural Geography: Processes, Responses and Experiences of Rural Restructuring, Sage Publication, London.

Major-XII GEOG 341 Population Geography

Objectives:

To make students understand the dynamics of population characteristics; Relationship between man, environment and resources. To highlight the importance of demographic data in planning and decision-making.

Course outline:

- Introduction
- Population theories
- Sources and methods of population data collection and associated problems
- Population distribution and density
- Urban and rural population
- Population composition: gender composition, age structure, marital status, families and households, languages, religions, ethnic groups etc.
- Population dynamics: Patterns of fecundity and fertility, morbidity and mortality
- Migration and its types
- Demographic transition
- Population growth and change
- Population Projections

Lab. Work:

Consultation of the Population Census of Pakistan and representation of population data on maps.

Recommended Books:

Ardagh, M. (2013) Textbook of Population Geography, Random Exports, New Delhi
Beayheu,G. J. (1966) Geography of Population. Prentice Hall, UK.
Beshers, J. M. (1967) Population Processes in Social System, New York.
Glenn, T. (1969) A Geography of Population World Pattern, John Wiley & Sons. New York & London.
John. I. C. (1997) Population Geography, UK.
Majid, H. (1994) Population Geography, Anmol Publications
Polunin, N. (1998) Population and global security, Cambridge University Press, UK.
Sharma, R. K. (2007) Demography and Population problems, Atlantic Publishers, New Delhi.
Waren, C. R. (1967) Studies in Demography of Pakistan, Karachi.
William, F. H. & Meluyn, J. (1993) An Introduction to Population Geography. University Press Cambridge, UK.
Wrebur, Z. (1970) A Prologue to Population Geography, Prentice Hall, New Jersey.

Semester 7Cr. Hrs. 3x5=15 Cr. Hrs.3x5=15

Five optional papers each with 3 credit hours and one compulsory paper on research methodology (including submission of research proposal to be conducted in semester 8) to be studied in semester 7. Five papers from group **A,B,C,D and E**. will be selected, not more then one paper from these given groups. The individual board of studies of various universities shall decide about the number of courses to be taken in this semester and shall prepare course outline for these papers or can add more topics depending on the availability of resources.

Elective Group Papers

Group 'A' Physical Geography

Course No	Title	Credit Hours
Geog. 411A	Pleistocene Geomorphology	3
Geog. 411B	Quaternary Geomorphology	3
Geog. 411C	Coastal Morphology	3
Geog. 411D	Fluvial Morphology	3
Geog. 411E	Glaciology	3
Geog. 411F	Desert Morphology	3

Geog. 411G	Soil Geography	3
Geog. 412A	Meteorology	3
Geog. 412B	Climate Change Studies	3
Geog. 413A	Hydro Geography	3
Geog. 414A	Plant Geography	3
Geog. 414B	Zoo Geography	3
Geog. 415A	Sedimentation and Stratigraphy	3
	Others	
Group 'B'	**Human Geography**	
Geog. 421A	Cultural Geography	3
Geog. 421B	Social Geography	3
Geog. 421C	Population Geography	3
Geog. 421D	Geography of Migration and Regional Development	3
Geog. 421E	Behavioural Geography	3
Geog. 421F	Historical Geography	3
Geog. 421G	Geography of Religions	3
Geog. 421H	Geography of Crimes	3
Geog. 421I	Geography of Recreation and Tourism	3
Geog. 421J	Gender Geography	3
Geog. 422A	Transportation Geography	3
Geog. 422B	Agricultural Geography	3
Geog. 422C	Geography of Manufacturing	3
Geog. 422D	Geography of Marketing	3
Geog. 422E	Industrial Geography	3
Geog. 423A	Urban Geography	3
Geog. 423B	Rural Settlement Geography	3
Geog. 423C	Urban and rural land use Studies	3
Geog. 423D	Regional Planning and Development	3
Geog. 423E	Geography of Housing	3
Geog. 424A	Political Geography	3
Geog. 425A	Medical Geography	3
Geog. 425B	Geography of Health Care	3
Geog. 425C	Geography of Nutrition	3
Geog. 429A	Military Geography	3
Geog. 429B	Geography of Administration	3
Geog. 430A	Geography of resource conservation	3
Geog. 431A	Geo-Archaeology	3
Geog. 432B	Geography of prehistoric cultures and civilizations	3
Geog. 432C	Anthro-Geography	3
	Others	

Group 'C'	**Applied Geography**	
Geog. 431A	Environmental perceptions in Geography	3
Geog. 431B	Quantitative Geography	3
Geog. 431C	Geography of Natural Hazards and Disasters	3
Geog. 431D	Applied Geomorphology	3
Geog. 431E	Development Planning	3
Geog. 431F	Sustainable Development of Natural Resources	3
Geog. 431G	Environmental Impact Assessment (EIA)	3
Geog. 431H	Applied Cartography	3
Geog. 431J	Social Impact Assessment (SIA)	3
Geog. 431K	Mountain Geography	3
Geog. 431L	Geography of Retailing	3
Geog. 431M	Urban Environmental Planning and management	3
Geog. 431N	Geography of Wetlands	3
Geog. 431O	Urban Planning	3
Geog. 431P	Urban and Landscape Ecology	3
Geog. 431Q	Geography of Boundaries and Conflicts	3
Geog. 431R	Natural Resources Research	3
	Others	
Group 'D'	**Regional Geography**	
Geog. 441A	East Asia	3
Geog. 441B	South and South East Asia	3
Geog. 441C	South West Asia	3
Geog. 441D	Central Asia	3
Geog. 442A	Western Europe	3
Geog. 442B	Eastern Europe	3
Geog. 443A	North America	3
Geog. 443B	Latin America	3
Geog. 444A	North Africa	3
Geog. 444B	Sub Saharan Africa	3
Geog. 445A	Australia	3
Geog. 449A	Muslim World	3
Geog. 450A	Russian Federation	3
Group 'E'	**Geo-informatics**	
Geog. 471A	Geographical Analysis	3
Geog. 471B	Global Positioning System	3

Geog. 471C	Digital Image Processing	3
Geog. 471D	Spatial Data Visualization	3
Geog. 471E	Spatial Modelling	3
Geog. 471F	Photogrammetry	3
Geog. 471G	Spatial Data Management	3
Geog. 471H	Cyber Cartography	3

Group 'F'	**Techniques**	
Geog. 481A	Mathematical Geography	3
Geog. 481B	Geodesy and Advanced surveying	3
Geog. 482A	Cartographic Techniques	3
Geog. 482B	Digital Cartography	3
Geog. 483A	Advanced Quantitative Analysis	3
Geog. 484B	Computer Modelling & Simulation	3
	Techniques in Geography	
	Others	

(Individual BOS/ institutions can prepare the outline of the course and add more courses/topics depending on the availability of qualified staff and resources).

SCHEME OF STUDIES FOR MS/MPHIL 2 YEARS

Eligibility:

i. BS 4 years Geography degree or minimum of 16 years of education (HEC recognized institutes/universities) shall be required for admission in 2 years MS Geography programme.

OR

ii. Those candidates having 4 years BS in any of the subject such as, GIS, Natural Sciences, Social and Behavioural Sciences, Environmental Sciences, Town/Urban & Regional Planning, shall have to enrol in prerequisite/deficiency courses as proposed by the individual Department/university and as per HEC prescribed guidelines. Those candidates who have not studied B.S. Geography have to attend the core courses in geography from semesters 5 and 6 or any other courses suggested by the Department of the University.

Duration and Course structure

- 2 years spread over 4 semesters (two semesters per year)

Degree Requirement

- 30 credit hours including thesis

Course Structure	Number of courses	Credit Hours
Deficiency courses (0 Semester)	As required*	--
Core courses (First semester)	3	12
Elective/specialized (Second semester)	3	12
Thesis (Third & Fourth semesters)	2(thesis)	06 (thesis)
Total	**10**	**30**

*** Mandatory for non-geographers**

Evaluation

For the uniformity in the evaluation system, NCRC recommends that the minimum CGPA required to pass a semester is HEC/respective University accordingly at post graduate level.

Course structure and Semesters

First semester

Serial No.	Core Courses in Geography	Credit Hours
Geog 510	Techniques in Geo-Informatics	4
Geog 580	Advanced Quantitative Techniques	4
Geog590	Advanced Research Methods	4
Total		**12**

Note: Respective Boards of Studies of the universities are allowed to make appropriate changes in course of studies depending on their available resources and requirement.

Second semester

Elective/Specialized Courses	Credit Hours
Four optional papers, each with 3 credit hours to be selected in second semester from specialization groups course No. 504 onward, but not more than one paper from group D given groups Number of options that shall be offered during the course of study shall depend upon the availability of faculty and lab facilities. More groups can also be added depending on the availability of resources. Optional courses are listed in Group A,B,C,D & E. More special topics could also be added to these by	**4x3 =12**

the board of studies of the individual departments. The respective Board of Studies of the Departments, keeping in view the availability of staff and resources, may prepare detailed outline of the courses and approve them accordingly (some course outlines have been presented herewith).	

Third and fourth semester

Course	Credit Hours
MS/M.Phil. Thesis Writing and its evaluation as per University Rules, in 3rd and 4th Semesters.	**6**

DETAIL OF COURSES

Geog. 510 Techniques in Geo-Informatics

Objectives:

This course introduces principles, concepts and applications of Geographic Information Systems (GIS). This course will also familiarize students with advanced topics of GIS such as spatial database accuracy assessment, 2D and 3D spatial modeling, analysis of discrete and continuous entities in space. There will be special emphasis on statistical analysis of spatial data. Students will be trained to develop models based on regression analysis and logical analysis. Students will also learn customization and automation in GIS and explore techniques to implement GIS on to Internet. Spatial analyses are undertaken using mainly ESRI's suit of ArcGIS and ERDAS Imagine (Apollo).

Course Outline:

- **Introduction**
  - Geographical Information System and Spatial Systems
  - ArcGIS Interface
  - Environment of ERDAS Imagine
- **Data Types in Geo-informatics**
  - Data Types (Spatial /Aspatial),
  - Data Models & Structures (Raster / Vector)
  - Attribute Data management
  - Exploring GIS Dataset in ArcCatalog,
  - Data Sources and Capturing Techniques
- **Remote Sensing Systems**
  - Sensors and Data

    - Data Extraction Techniques
    - Image Classification
    - RS Data Applications
    - Data Classification and Thematic Mapping
    - Image Interpretation and Analysis
- **Displaying and Manipulation of spatial information**
    - Vector Data Preparation
    - Working on vector data in ArcGIS
    - Building Attribute Datasets
- **GPS Data Integration**
    - GPS System of Navigation
    - Integrating GPS data in GIS Environment
    - Coordinate based point mapping
- **Data Transformation**
    - Raster / Vector Conversion
    - Conversion of different projections (raster/vector)
    - Attribute Data Mapping
- **Measurement and Query**
    - Linear Measurements
    - Area Calculation and Tabulation
    - Tabulate Areas
    - Vector Data Query and Object Selection
- **Errors and Uncertainties**
    - Limitations of Resolution
    - Topological Errors
    - Accuracy and Uncertainty
- **Spatial Exploration and Analysis**
    - Buffering
    - Density Mapping
    - Map Overlay analysis
    - Interpolation
    - Survey Data Integration
    - Surface and Zonal Analysis
    - 3D Analysis
    - Functional Surfaces
    - Area Objects and Spatial Autocorrelation
    - Map Algebra and Multivariate Analysis
- **Applications**

Lab Work:

Introduction to GIS Lab (hardware / software), Raster/Vector/Attribute Data Display, Scanning, Digitization, Coordinate based point mapping, Raster / Vector Conversion, Data layer integration and display of different projections, Map layout, Data Classification and Thematic Mapping, Handling with Topological Errors, Overlay and network analysis. Spatial Analyses: Conditional, Density, Distance, Extraction, Generalization, Ground Water, Hydrology, Interpolation, Local, Map Algebra, Mathematical, Multivariate, Neighborhood, Overlay, Raster Creation, Reclassification, Surface and Zonal Analysis. 3D Analysis: Conversion, Functional Surfaces, TIN Creation and TIN Surface Analysis in ArcMap and 3D visualization in ArcScene and ArcGlobe

Recommended Books:

Aronoff, S. (2005) Remote Sensing for GIS Managers, ESRI Press, Redlands.
Chang, K. (2012) Introduction to Geographic Information Systems, McGraw Hill Company, New York.
Clarke, K. (2004) Getting started with Geographic Information System, Prentice Hall, New York.
Duckham, M., Michael, F. (2003) Foundations of Geographic Information Science, Tylor& Francis, USA.

Haining, R. (2003) Spatial Data Analysis, Theory and Practice, Cambridge University Press, USA.
Heywood, I., Cornelius, S. & Carver, S. (2003) An introduction to Geographic Information System, Addison Wesley Longman, New York.
Sullivan, D. & Unwin, D. J. (2003) Geographic Information Analysis, John Wiley & Sons, Inc., Canada.

Geog: Advanced Physical Geography

Objective

To evolve critical thinking amongst MS/ MPhil students on current issues related to physical phenomena on the earth.

Course outline

- Recent advances in Physical Geography
- Geomorphic processes and structures
    - Significance of Tectonic and Denudation processes in the evolution of landforms
- Natural hazards
    - Mass wasting and their impacts
    - Earthquakes, tsunami, volcanism, cyclones, floods
    - Drought and desertification, causes and impacts

    - Impacts of natural reservoirs on eco-systems
- Bio-geography
    - Bio-diversification and ecological equilibrium
    - Degradation of soils and ground water
    - Watershed management; high latitude and high altitude problems
- Climatic elements and mitigations
    - Global Warming
    - Ozone Layer depletion
    - Major scenario of climate variability
    - Global climate change; major scenarios of climate change;
    - Sea surface temperature anomalies(El Niño/La Niña) ozone depletion
    - Variability in Jet streams and their effects on planetary circulation
- Environmental Issue

Recommended Books:

Ahrens, C. D.(2008) Essentials of Meteorology: An Invitation to the Atmosphere, Thomson Learning, Inc.

Allaby, M. (2008) Oxford Dictionary of Earth Science, Oxford University Press, New York.

Critchfield, H. J. (2004) General Climatology, Prentice Hall, London.

Cox, C. B. & Moore, D. P. (2010) Biogeography: An Ecological and Evolutionary Approach.John Wiley & Sons. Canada.

Food And Agriculture Organization (FAO). (2009) Agriculture and Environmental Challenges of the twenty-first century: a strategic approach for FAO. Report No. COAG/2009/3, 11. Rome.

Homar, A. (2002) Environmental Pollution and Agriculture. APH Publishing Corporation, New Delhi.

Hyndman, D. (2010) Natural Hazards and Disasters. Third Editions. Published by Yollanda Cassio

Khan, M. A. & Grwal. S. K. (2004) Environmental Geography, APH Publishing Corporation, New Delhi.

Lal, R. K. & Stewart, B.A. (2000) Global Climate Change and Tropical Ecosystem. CRC Press LLC.

Lomolino, M. V. (2006) Biogeography. Third Edition. Published by Sinauer Associates.

Lutgens, F. K. & Tarbuck, E. J. (2007) The Atmosphere – an introduction to meteorology. Prentice Hall, New Jersey.

Marsh, M. & Grossa, J. J. (2005) Environmental Geography, John Wiley & Sons, New York.

Mathus, H. S. (2003) Essentials of Biogeography. Pointer Publishers, India

Nagarajan, R. (2009) Drought. Capital Publishing Company.

Trivedi, P. R. (2004) Environmental Pollution and Control. APH Publishing Corporation, New Delhi.

Trivedi, P. R. (2011) Ecology and Environment, APH Publishing Corporation, New Delhi.
Trivedi, P.R. (2010) Natural Resource Conservation, APH Publishing Corporation, New Delhi.
White, G. F. (1993) Natural Hazards, Oxford University Press, Oxford.

Geog: 520 Advanced Human Geography

Objectives
To develop an understanding of the systematic organization of economic, cultural, political, demographic and occupancy milieu and the spatial variations of man-environment relationship citing real world examples with special emphasis on Pakistan.

Course outline

- Recent Approaches in Human Geography
- Scope, status,
    - Significance, domains,
- Historical development of Human Geography
- Concepts and Philosophies in Human Geography:
    - Determinism,
    - Possibilism,
    - Probabilism
    - Cognitive behaviour.
    - Inductive Generalization
    - Deductive and systematic approach, man environment relationship.
- Environmental perception, management and anthropogenic actions.
    - Impact of population growth and change
    - Urbanization
    - World economic patterns
    - World Political Systems
    - Cultural patterns
- Human development – the Welfare Approach

Recommended Books:

Becker, A. & Secker (2002) Human Geography: Culture, Society, and Space, Seventh Edition, John Wiley and Sons. Canada.
Botkin, D.B & Keller, E.A. (2007) Environmental science: Earth as a Living Planet. John Wiley &Sons Inc., Canada.
Castree, N., Demeritt, D., Liverman, D. & Rhoads, B. (2009) A Companion to Environmental Geography. John Wiley & Sons Inc. Canada.
Chuck, F. M. & Glassner. (2003) Political Geography, Third Edition, John Wiley, New York.

Clifford, N., French, S. & Valentine, G. (2010) Key methods in Geography. Second Edition. SAGE Publications Ltd.
Deblij, H. J., Murphy, A. B. & Fouberg, E.H. (2012) Human Geography: Culture, Society and Space 10th Edition. John Wiley & Sons Inc., Canada.
Fellman, J. & Getis, A. (2003) Human Geography, Landscape of Human Activities, Oxford University Press, Oxford.
Harper, H. L. (2012) Environment and Society: Human Perspectives on Environmental Issues, Fifth Edition, Prentice Hall, New York.
Hussain, M. (1994) Population Geography, Anmol Publication.
James, M. R. (2010) An Introduction to Human Geography, The Cultural Landscape, Prentice Hall, Canada.
Knox, P. L. & Marston, S. A. (2010) Places and Regions in Global Context: Human Geography, Fifth Edition, Prentice Hall, New York.
Lewis, C. P., Fox, M. & Dwyer, C. (2001) Village, Hamlet and Field: Changing Medieval Settlements in Central England, Windganter Press.
Limb. M. & Dwyer. C. (2001) Qualitative Methodologies for Geographers: Issues and debates. Oxford University Press, Oxford.
Marsh, W. M. & Grossa, J. (2005) Environmental Geography, Science, Land Use and Earth System, John Wiley and Sons, Hopkins.
Miller, G.T & Spoolman, S. (2011) Environmental Science. Brooks Cloe, London.
Neuwirth, R. (2004) Shadow Cities: A Billion Squatters. A New Urban World, Routledge, London.
Nicholas, P. (1998) Population and Global Security. Cambridge University Press, UK.
Truman, H. & Alexander, J. W. (1992) Economic Geography, Prentice Hall, India.
Rowntree, L. (2004) Globalization and Diversity, Geography of a Changing World: A Modern Synthesis, Harper International, London, Prentice Hall, New York.
Todaro, M. P & Smith, S. (2011) Economic Development. Eleven Edition. Prentice Hall, New York.
United Nation Development Program (UNDP), (2012) Human Development Reports (1990 -2012) http://hdr.undp.org/en/.

Geog: 590 Advanced Research Methods

Objective

To enable students to conduct independent research including literature review and search
To train students in collection, analysis, interpretation, presentation and organization of data

Course outline

- Approaches and types of research:
    - Historical research, qualitative/descriptive research;

- Case referent study/cross sectional research,
- Longitudinal, causal-comparative research,
- Experimental research; evaluative studies, forecasting studies, design and feasibility studies,

- **Research design**
  - Ethical issues,
  - Formulation and statement of research problem,
  - Conceptual framework,
  - Research questions, research hypotheses, research objectives,
  - Research plan
- **Review of Literature**
  - Preparation
  - Sources
  - Abstracting
  - Citation and Referencing
- **Data collection**
  - Universe and sampling:
  - Primary and secondary data, sources of data, selection of a sample,
  - Variables and measuring instruments,
  - Basic considerations in sampling, size of sample,
  - Geo-statistical considerations. Sampling units and design; points,
  - Traverses, random and non-random sampling, stratified,
  - Purposive and systematic sampling.
- **Data analysis and interpretation**
  - Use of statistical/ quantitative methods e.g.;
  - Central tendency, dispersion, and variability. Scatter diagram,
  - Standard error and probability
  - Methods of correlation: linear, non-linear, multiple,
  - The product moment correlation, Spearman's rank correlation, correlation matrix,
  - Regression analysis, testing of hypothesis and significance:
  - Chi Square, "T" test, "F" test, Analysis of variance (ANOVA), Multivariate analysis. Factor analysis and principal components analysis; empirical orthogonal function (EOF)
  - Poisson test, Mantle-haenszel test, scatter diagram, methods of constructing regression lines and mapping residuals,
  - Interpolation, prediction and explanation
- **Computer analysis:**
  - Classification by grouping similar observations, multivariate analysis.

- Introduction to EPI. Info/ CIET Map /SPSS: PC and
- database for quantitative analysis

- **Research report writing, Bibliography and references**
- **Qualitative Research**

Recommended Books:

Ackerman, E. A. (1958) Geography as a Fundamental Research Discipline, University of Chicago Press, Chicago.

Bannet, N. (1973) Research Design. Milton Keynes, the Open University, UK

Chapman J. & McGraw J.R. (1993) An Introduction to Statistical Problems Solving in Geography Oxford: WCB

Ebdon, D. (1977) Statistics in Geography, Basil Blackwell, Oxford.

Gay L. R. (1992) Educational Research: Competencies for Analysis and Application" Fifth edition, McMillan Publishing Company.

Gee, W. (1950) Social Science Research Method, Appleton Century Crofts, Inc. New York.

Gregory, S. (1973) Statistical Methods and the Geographers, Longman, London.

Goodchild, M. F. (1995). Geographic Information System and Geographic Research. Ground truth: the social implications of geographic information systems. pp. 31-51

Hammond, R. E. & Cullagh, M. (1978) Quantitative Techniques in Geography, Clarendon Press, Oxford.

Haring, L. L. (1992) Introduction to Scientific Geographic Research Oxford: ECB

Hartshorne, R. (1959) Perspective on the Nature of Geography, John Murray, London.

Howard, K. & Sharp, J. A. (1983) The Management of a Student Research Project. Gower Publishing Company, UK.

Huff, D. (1973) How to Lie with Statistics, Hammonds-worth, Penguin.

Lyne, T. (1990) Research Methods and Statistical Analysis. IPS Nottingham University, UK.

Maguire, D. J. (1989) Computers in Geography London: Longman, London.

Matthew, H. & Foster, I. (1989) Geographical Data. Sources, Presentation and Analysis Oxford: Oxford University Press, Oxford.

Saxena, H. C. (1993) An easy approach to statistics, New Delhi.

Taylor, P. J. (1977) Quantitative Methods in Geography, Houghton Mifflin, Boston.

Walker. (1963) The Nature of Scientific Thought, Prentice Hall, New Jersey.

Wright. (1951) Aids to Geographical Research, Columbia University Press, New York.

Semester 2 Cr. Hrs.3x4=12

Four optional papers, each with 3 credits hrs to be selected in second semester from specialization groups course No. 704 onward, but not more than one paper from group D

Number of options that shall be offered during the course of study shall depend upon the availability of faculty and lab facilities. More groups can also be added depending on the availability of resources. Optional courses are listed in Group A,B,C,D & E. More special topics could also be added to these by the board of studies of the individual departments. The respective Board of Studies of the Departments, keeping in view the availability of staff and resources, may prepare detail outline of the course and approve it accordingly (for some of the paper the course outline is prepared and given).

Optional Course model

Geog. 564 Principles of Wetlands Ecology and their Management

Objective:

This course focuses primarily on the ecology of wetlands and wetland processes from an ecological perspective, focusing on the conservation and management of wetland ecosystem for Master of Science students.

Course Outline:

- **Concepts and definition of wetlands,**
  - History of wetland science and management;
- **Wetland classifications,**
  - Types of wetlands, classification systems;
  - Wetlands of Pakistan, wetland ecosystem structure and dynamics;
- **Wetlands functions,**
  - Values and significance; hydrology and biogeochemistry,
  - Soils, water quantity, recharge, landscape
  - Watershed processes, water quality and nutrient cycling,
- **Wetlands habitats,**
  - Wetland biodiversity;
  - habitat connectivity across a landscape
- **Management of wetlands,**
  - importance and components of wetlands management,
  - GIS and wetland delineation, inventory and monitoring, ecological integrity or health assessment based on physical, chemical and biological matrices, environment impact assessment of wetlands, ecological risk assessment,
  - Public and/or stakeholder participation in wetlands management, planning, wetlands restoration techniques, protection of wetlands, buffers and corridors, minimizing hydrologic effects,
  - Minimizing water quality and sedimentation effects , design considerations during construction
  - Long-term computer-based wetland decision support system; community education on wetland issues; issues related to wetlands conservation in Pakistan,
  - Gaps in wetlands management in Pakistan, international convention(s) for wetland conservation and our obligations

Lab Work:

Ecological survey design and sampling: Field visits and sampling for various wetland matrices: water, sediment, invertebrate, vertebrate, bird migration, socio-economic survey; assessment of biological diversity at wetlands; water and sediment quality, assessment of flora and fauna for environmental contaminants, evaluation survey, designing a management plan for wetland conservation, creation of wetland for pollution control, development of wetland inventory and delineation

Recommended Books:

Ahmad, N & Chaudhry, G.R. (1988) Irrigated Agriculture of Pakistan. Shahzad Nazir, 61B/2, Gulberg, III, Lahore, Pakistan.

Ahmad, N. (1993) Water Resources of Pakistan, Shahzad Nazir, 61B/2, Gulberg, III, Lahore, Pakistan.

Batzer, D. P. & Sharitz, R. R. (Eds.) (2006) Ecology Freshwater and Estuarine Wetlands. Berkeley, University of California Press, USA.

Cronk, J. K. & Fennessy, M. S. (2001) Wetland Plants: Biology and Ecology. CRC Press/Lewis Publishers. Boca Raton.

Falkenmark, M., & Rockstorm, J. (2005) Balancing Water for Humans and Nature. Earthscan, UK.

Headley, T. R. & Kadlec, R. H. (2007) Conducting hydraulic tracer studies of constructed wetlands: a practical guide Ecohydrology& Hydrobiology, Vol. 7, pp. 269-282.

Keddy, P.A. (2010) Wetland Ecology. Principles and Conservation. Cambridge Studies in Ecology, Cambridge University Press, UK.

Maltby, E. & Barker, T. (2009) The Wetlands Handbook, Willey Backwell, UK.

Mitsch, W.J. & Gosselink, J.G. (2007) Wetlands, Fourth Edition, John Wiley and Sons, Inc., New York.

Mitsch, W.J., Gosselink, J.G., Zhang, L. & Anderson, C.J. (2009) Wetland ecosystems, John Wiley and Sons, Inc., New York.

Moshiri, G.A. (Eds.) (1994) Constructed wetlands for water quality improvement. CRC Press, Boca Raton.

Richardson, J.L. & Vepraskas, M. J. (Eds.) (2000) Wetland Soils: genesis, hydrology, landscapes, and classification, Lewis Scientific Publ., Boca Raton

Saunier, R. E. & Meganck, R.A. (Eds.) (1995) Conservation of Biodiversity and the New Regional Planning. Department of Regional Development and Environment Executive Secretariat for Economic and Social Affairs General Secretariat, Organization of American States, IUCN.

Schoeneberger, P.J. & Wysocki, D.A. (2005) Hydrology of soils and deep regolith: A nexus between soil geography, ecosystems and land management, Geoderma, Vol. 126, pp. 117-128.

Van der Valk, A.G. (2012) The biology of freshwater wetlands, Second Edition, Oxford University Press, Oxford.

Weller, M.W. (2005) Wetland Birds: Habitat, Resources and Conservation Implications. Amazon Publishers, USA.

Groups and list of optional papers

Group 'A'	**Physical Geography**	
Course No	**Title**	**Credit Hours**
Geog. 611A	Pleistocene Geomorphology	3
Geog. 611B	Quaternary Geomorphology	3
Geog. 611C	Coastal Morphology	3
Geog. 611D	Fluvial Morphology	3
Geog. 611E	Glaciology	3
Geog. 611F	Desert Morphology	3
Geog. 611G	Soil Geography	3
Geog. 612A	Meteorology	3
Geog. 612B	Climatic Change Studies	3
Geog. 613A	Hydro-geography	3
Geog. 614A	Advance Plant Geography	3
Geog. 614B	Zoo-Geography	3
Group 'B'	**Human Geography**	
Geog. 621A	Cultural Geography	3
Geog. 621B	Social Geography	3
Geog. 621C	Population Geography	3
Geog. 621D	Geography of Migration and Regional Development	3
Geog. 621E	Behavioural Geography	3
Geog. 621F	Historical Geography	3
Geog. 621G	Geography of Religion	3
Geog. 621H	Geography of Crimes	3
Geog. 621I	Geography of Recreation and Tourism	3
Geog. 621J	Gender Geography	3
Geog. 622A	Transportation Geography	3
Geog. 622B	Agriculture Geography	3
Geog. 622C	Geography of Manufacturing	3
Geog. 622D	Geography of Marketing	3
Geog. 622E	Industrial Geography	3
Geog. 623A	Urban Geography	3
Geog. 623B	Rural Settlement Geography	3
Geog. 623C	Urban and rural land use	3
Geog. 623D	Regional Planning	3
Geog. 623E	Geography of Housing	3
Geog. 624A	Political Geography	3
Geog. 625A	Medical Geography	3
Geog. 625B	Geography of Health Care	3

Geog. 625C	Geography of Nutrition	3
Geog. 629A	Military Geography	3
Geog. 629B	Geography of Administration	3
Group 'C'	**Applied Geography**	
Geog. 631A	Environmental Geography	3
Geog. 631B	Quantitative Geography	3
Geog. 631C	Geography of Natural Hazards and Disasters	3
Geog. 631D	Applied Geomorphology	3
Geog. 631E	Development Planning	3
Geog. 631F	Sustainable Development of Natural Resources	3
Geog. 631G	Environmental Impact Assessment (EIA)	3
Geog. 631H	Applied Cartography	3
Geog. 631I	Advance Applied Geography	3
Geog. 631J	Social Impact Assessment (SIA)	3
Geog. 631K	Mountain Geography	3
Geog. 631L	Geography of Retailing	3
Geog. 631M	Urban Environmental Planning and Management	3
Geog. 631N	Geography of Wetlands	3
Geog. 631O	Urban Planning	3
Geog. 631P	Urban and Landscape Ecology	3
Geog. 631Q	Geography of Boundaries and Conflicts	3
Geog. 631R	Natural Resources Research	3
Group 'D'	**Regional Geography**	
Geog. 641A	Far East	3
Geog. 641B	South and South East Asia	3
Geog. 641C	South West Asia	3
Geog. 641D	Central Asia	3
Geog. 642A	Western Europe	3
Geog. 642B	Eastern Europe	3
Geog. 643A	North America	3
Geog. 643B	Latin America	3
Geog. 644A	North Africa	3
Geog. 644B	Sub Saharan Africa	3
Geog. 645A	Australia	3
Geog. 649A	Muslim World	3
Group 'E'	**Geo-informatics**	
Geog. 671A	**Geographical Analysis**	**3**
Geog. 671B	Global Positioning System	3
Geog. 671C	Digital Image Processing	3
Geog. 671D	Spatial Data Visualization	3

Geog. 671E	Spatial Modeling	3
Geog. 671F	Photogrammetry	3
Geog. 671G	Spatial Data Infrastructure	3
Geog. 671H	Cyber Geography	3
Group 'F'	**Techniques**	
Geog. 681A	Mathematical Geography	3
Geog. 681B	Geodesy /and Advance surveying	3
Geog. 682A	Cartographic Techniques	3
Geog. 682B	Computer Cartography	3

(Individual institutions can prepare the outline of the course and add more topics depending on the availability of the qualified staff and the resources).

RECOMMENDATIONS FOR BS/ MS/ MPHIL COURSES IMPLEMENTATION

1. NCRC recommended that a National level workshop should be organized by HEC to discuss the problems related to the implementation of the 4 year BS and 2 year MS/ M.Phil. Geography curriculum at the national level at regular intervals. In principal, HEC should invite in all NCRC meetings the heads of Geography departments from all public sector universities.

2. The broad spectral domain of geography provides an opportunity for a wide range of useful multi–disciplinary associations. Therefore, HEC is requested to advise the institutions to provide maximum range of combinations both with BS sciences, humanities and commerce groups.

3. Opening of Geography Departments in all general public sector universities of the country including Quaid-i-Azam University Islamabad.

4. Provision of computers for geography labs. There should be Central Computer lab. in each institution/colleges to provide computing facility to the different disciplines of sciences including geography. The GIS and Remote Sensing software should be provided at least to the post graduate level institutions where geography is taught.

5. Refresher courses should be arranged at regular intervals for college teachers (preferably at District level) to keep them abreast with continuing changes in the discipline in the given fields.
   a. Physical Geography
   b. Human Geography
   c. Quantitative Methods in Geography
   d. Field study and Surveying Techniques
   e. Aerial Photographs and remote sensing including GPS
   f. Computing and GIS

6. HEC is requested to provide adequate funds for field works/research works related to geography in the institutions.

7. Sufficient funds should be allocated by the institutions for the purchase of teaching aids, surveying and computing equipment/instruments, GPS, Total Station and other field survey equipments.

8. Geography must be treated at par with other physical sciences by the HEC and other National bodies.

9. Facility of publications and distribution of journals, monographs and books in geography be provided by HEC to the respective Departments.

10. The HEC may advise subordinate institutions to run short-term courses during summer/ winter vacations within the ramifications of Geography enabling its teachers to enhance their knowledge. NCRC strongly recommends revitalization and introduction of Geography as a subject in various departments of the colleges.

11. Introduction of Geography as a subject in the curriculum of B.Ed. and M.Ed. Degree programs

12. Development of well-equipped seminar libraries and provision of funds for appropriate collection of journals, literature and reference materials including government publications.

13. Organizing refresher courses regularly for postgraduate teachers in collaboration with Survey of Pakistan, PMD, and SUPARCO etc. to cover the practical syllabus related with Instrumental Surveying, GIS and Remote Sensing.

14. Appropriate funds should be provided by HEC for the organization of Workshops and conferences along with the publications of the professional journals.

15. Ample funds should be provided by HEC for the purchase of books journals

Annexure - A

COMPULSORY COURSES

COMPULSORY COURSES IN ENGLISH FOR BS (4 YEAR) IN BASIC & SOCIAL SCIENCES

English I (Functional English)

Objectives: Enhance language skills and develop critical thinking.

Course Contents

Basics of Grammar
Parts of speech and use of articles
Sentence structure, active and passive voice
Practice in unified sentence
Analysis of phrase, clause and sentence structure
Transitive and intransitive verbs
Punctuation and spelling

Comprehension
Answers to questions on a given text

Discussion
General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

Listening
To be improved by showing documentaries/films carefully selected by subject teachers

Translation skills

Urdu to English

Paragraph writing
Topics to be chosen at the discretion of the teacher

Presentation skills
Introduction

Note: Extensive reading is required for vocabulary building

Recommended books:

1. Functional English
a) Grammar

1. Thomson, A. J., & Martinet, A.V., (1997) Practical English Grammar, Exercises 1, Third edition. Oxford University Press, Oxford, ISBN 0194313492
2. Thomson, A. J., & Martinet, A.V.,(1997) Practical English Grammar, Exercises 2, Third edition, Oxford University Press, ISBN 0194313506

b) Writing

1. Boutin, M. C., Brinand, S. & Grellet, F., (1993) Writing. Intermediate, Oxford Supplementary Skills, Fourth Impression, ISBN 0 19 435405 7 Pages 20-27 and 35-41.

c) Reading/Comprehension

1. Tomlinson, B. & Ellis, R. (1992) Upper Intermediate, Oxford Supplementary Skills. Third Impression, ISBN 0 19 453402 2.

d) Speaking

English II (Communication Skills)

Objectives: Enable the students to meet their real life communication needs.

Course Contents

Paragraph writing
Practice in writing a good, unified and coherent paragraph

Essay writing
Introduction

CV and job application

Translation skills
Urdu to English

Study skills
Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills
Letter/memo writing, minutes of meetings, use of library and internet

Presentation skills
Personality development (emphasis on content, style and pronunciation)

Note: documentaries to be shown for discussion and review

Recommended Books:

Communication Skills

a) Grammar

1. Thomson, A. J. & Martinet, A. V. (1986) Practical English Grammar, Exercises 2., Third edition, Oxford University Press, ISBN 0 19 431350 6.

b) Writing

1. Boutin, M. C., Brinand, S. & Grellet, F., (1993) Writing. Intermediate, Oxford Supplementary Skills, Fourth Impression, ISBN 019 435405 7 Pages 45-53 (note taking). Nolasco, R. (1992) Writing. Upper-Intermediate, Oxford Supplementary Skills. Fourth Impression, ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Tomlinson, B. & Ellis R., (1991) Oxford Supplementary Skills. Third Impression, ISBN 0 19 453403 0.

English III (Technical Writing and Presentation Skills)

Objectives: Enhance language skills and develop critical thinking

Course Contents

Presentation skills

Essay writing
Descriptive, narrative, discursive, argumentative

Academic writing
How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical Report writing

Progress report writing

Note: Extensive reading is required for vocabulary building

Recommended Books:

Technical Writing and Presentation Skills

a) Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).

2. College Writing Skills by John Langan. McGraw-Hill Higher Education. 2004.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.

b) Presentation Skills

c) Reading

The Mercury Reader. A Custom Publication. Compiled by northern Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

Annexure - B

Pakistan Studies (Compulsory)

Introduction/Objectives

- Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
- Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

Course Outline

1. **Historical Perspective**

   a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.

   b. Factors leading to Muslim separatism

   c. People and Land
      i. Indus Civilization
      ii. Muslim advent
      iii. Location and geo-physical features.

2. **Government and Politics in Pakistan**

   Political and constitutional phases:
   a. 1947-58
   b. 1958-71
   c. 1971-77
   d. 1977-88
   e. 1988-99
   f. 1999 onward

3. **Contemporary Pakistan**

   a. Economic institutions and issues
   b. Society and social structure
   c. Ethnicity
   d. Foreign policy of Pakistan and challenges
   e. Futuristic outlook of Pakistan

Recommended Books:

Afzal, M. R. (1998) Political Parties in Pakistan, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research.
Amin, T. Ethno -National Movement in Pakistan, Islamabad: Institute of Policy Studies, Islamabad.
Burki, S. J. (1980) *State & Society in Pakistan, t*he Macmillan Press Ltd

Burke, S. M & Ziring, L. (1993) Pakistan's Foreign policy: An Historical analysis. Karachi: Oxford University Press.
Haq, N. (1993) *Making of Pakistan: The Military Perspective.* Islamabad:

Mehmood, S. (1994) *Pakistan Political Roots & Development.* Lahore.
Waseem, M. (1987) Pakistan under Martial Law, Lahore: Vanguard.

National Commission of Historical and Cultural Research.

Sayeed, K.B. (1967) t*he Political System of Pakistan.* Boston: Houghton Mifflin. Aziz, K.K. (1976) *Party, Politics in Pakistan,* Islamabad: National Commission on Historical and Cultural Research.

Wilcox, W. (1972) *the Emergence of Bangladesh.,* Washington: American Enterprise, Institute of Public Policy Research.
Zahid, A. (1980) *History & Culture of Sindh.* Karachi: Royal Book Company.
Zaidi, A.S. (2000) *Issue in Pakistan's Economy.* Karachi: Oxford University Press.
Ziring, L. (1980) Enigma *of Political Development.* Kent England: WmDawson& Sons Ltd.

Annexure - C

ISLAMIC STUDIES
(Compulsory)

Objectives:

This course is aimed at:

1 To provide Basic information about Islamic Studies
2 To enhance understanding of the students regarding Islamic Civilization
3 To improve Students skill to perform prayers and other worships
4 To enhance the skill of the students for understanding of issues related to faith and religious life.

Detail of Courses

Introduction to Quranic Studies

1) Basic Concepts of Quran
2) History of Quran
3) Uloom-ul -Quran

Study of Selected Text of Holly Quran

1) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
5) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

Study of Selected Text of Holly Quran

1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
3) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I

1) Life of Muhammad Bin Abdullah (Before Prophet Hood)
2) Life of Holy Prophet (S.A.W) in Makkah
3) Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II

1) Life of Holy Prophet (S.A.W) in Madina
2) Important Events of Life Holy Prophet in Madina
3) Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah

1) Basic Concepts of Hadith
2) History of Hadith
3) Kinds of Hadith
4) Uloom –ul-Hadith
5) Sunnah& Hadith
6) Legal Position of Sunnah

Selected Study from Text of Hadith

Introduction to Islamic Law & Jurisprudence

1) Basic Concepts of Islamic Law & Jurisprudence
2) History & Importance of Islamic Law & Jurisprudence
3) Sources of Islamic Law & Jurisprudence
4) Nature of Differences in Islamic Law
5) Islam and Sectarianism

Islamic Culture & Civilization

1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

Islam & Science

1) Basic Concepts of Islam & Science
2) Contributions of Muslims in the Development of Science
3) Quran & Science

Islamic Economic System

1) Basic Concepts of Islamic Economic System
2) Means of Distribution of wealth in Islamic Economics
3) Islamic Concept of Riba
4) Islamic Ways of Trade & Commerce

Political System of Islam

1) Basic Concepts of Islamic Political System
2) Islamic Concept of Sovereignty
3) Basic Institutions of Govt. in Islam

Islamic History

1) Period of Khlaft-E-Rashida
2) Period of Ummayyads
3) Period of Abbasids

Social System of Islam

1) Basic Concepts of Social System of Islam
2) Elements Of Family
3) Ethical Values Of Islam

Recommended Books:

Bhatia, H.S. (1989) “Studies in Islamic Law, Religion and Society” Deep & Deep Publications New Delhi Hassan, H.H. “An Introduction to the Study of Islamic Law” leaf Publication Islamabad, Pakistan.
Hasan, A. (1993) “Principles of Islamic Jurisprudence” Islamic Research Institute, International Islamic University, Islamabad.
Muhammad, H. “Emergence of Islam” IRI, Islamabad Muhammad, H. “Muslim Conduct of State”

Muhammad, H. ‘Introduction to Islam Mulana Muhammad Yousaf Islahi,”

Waliullah, M. (1982) “Muslim Jurisprudence and the Quranic Law of Crimes” Islamic Book Service Zia-ul-Haq, M. (2001) “Introduction to Al Sharia Al Islamia ”Allama Iqbal Open University, Islamabad.

Annexure - D

Note: One course will be selected from the following six courses of Mathematics.

COMPULSORY MATHEMATICS COURSES FOR BS (4 YEAR)

(FOR STUDENTS NOT MAJORING IN MATHEMATICS)

1. MATHEMATICS I (ALGEBRA)

Prerequisite (s): Mathematics at secondary level

Credit Hours: 3 + 0

Specific Objectives of the Course: To prepare the students, not majoring in mathematics, with the essential tools of algebra to apply the concepts and the techniques in their respective disciplines.

Course Outline:

Preliminaries: Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions.
Matrices: Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer's rule.

Quadratic Equations: Solution of quadratic equations, qualitative analysis of roots of a quadratic equations, equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations.

Sequences and Series: Arithmetic progression, geometric progression, harmonic progression.
Binomial Theorem: Introduction to mathematical induction, binomial theorem with rational and irrational indices. *Trigonometry:* Fundamentals of trigonometry, trigonometric identities.

Recommended Books:

Dolciani, M.P., Wooton, W., Beckenback, E. F. & Sharron, S. (1978) *Algebra 2 and Trigonometry*, Houghton & Mifflin, Boston.
Kaufmann, J. E. (1978) College *Algebra and Trigonometry*, PWS-Kent Company, Boston

Swokowski, E. W. (1986) *Fundamentals of Algebra and Trigonometry* (6th edition), PWS-Kent Company, Boston

2. MATHEMATICS II (CALCULUS)

Prerequisite(s): Mathematics I (Algebra)

Credit Hours: 3 + 0

Specific Objectives of the Course: To prepare the students, not majoring in mathematics, with the essential tools of calculus to apply the concepts and the techniques in their respective disciplines.

Course Outline:

Preliminaries: Real-number line, functions and their graphs, solution of equations involving absolute values, inequalities.
Limits and Continuity: Limit of a function, left-hand and right-hand limits, continuity, continuous functions.

Derivatives and their Applications: Differentiable functions, differentiation of polynomial, rational and transcendental functions, derivatives.
Integration and Definite Integrals: Techniques of evaluating indefinite integrals, integration by substitution, integration by parts, change of variables in indefinite integrals.

Recommended Books:

Anton, H., Bevens, H. & Davis, S. (2005) Calculus, 8th edition, John Willey & Sons, Inc Stewart, J. (1995) *Calculus* (3rd edition) Brooks/Cole
Swokowski, E.W. (1983) *Calculus and Analytic Geometry*, PWS-Kent Company, Boston Thomas, G. B. & Finney, A. R. (2005) *Calculus* (11th edition), Addison-Wesley, Reading, Ma, USA

3. MATHEMATICS III (GEOMETRY)

Prerequisite(s): Mathematics II (Calculus)

Credit Hours: 3 + 0

Specific Objectives of the Course: To prepare the students, not majoring in mathematics, with the essential tools of geometry to apply the concepts and the techniques in their respective disciplines.

Course Outline:

Geometry in Two Dimensions: Cartesian-coördinate mesh, slope of a line, equation of a line, parallel and perpendicular lines, various forms of equation

of a line, intersection of two lines, angle between two lines, distance between two points, distance between a point and a line.
Circle: Equation of a circle, circles determined by various conditions, intersection of lines and circles, locus of a point in various conditions.
Conic Sections: Parabola, ellipse, hyperbola, the general-second-degree equation

Recommended Books:

Abraham, S. (1969) Analytic Geometry, Scott, Freshman and Company.
Kaufmann, J. E. (1987) College *Algebra and Trigonometry*, PWS-Kent Company, Boston Swokowski, E. W. (1986) *Fundamentals of Algebra and Trigonometry* (6th edition), PWS-Kent Company, Boston

4. COURSE FOR NON-MATHEMATICS MAJORS IN SOCIAL SCIENCES

Title of subject:		MATHEMATICS
Discipline	:	BS (Social Sciences).
Pre-requisites	:	SSC (Metric) level Mathematics
Credit Hours	:	03 + 00
Minimum Contact Hours:		40
Assessment	:	written examination;
Effective	:	2008 and onward

Aims : To give the basic knowledge of Mathematics and prepare the students not majoring in mathematics.

Objectives : After completion of this course the student should be able to:

- Understand the use of the essential tools of basic mathematics;
- Apply the concepts and the techniques in their respective disciplines;
- Model the effects non-isothermal problems through different domains;

Contents :

1. ***Algebra*** **:** *Preliminaries:* Real and complex numbers, Introduction to sets, set operations, functions, types of functions. *Matrices:* Introduction to matrices, types of matrices, inverse of matrices, determinants, system of linear equations, Cramer's rule. *Quadratic equations:* Solution

of quadratic equations, nature of roots of quadratic equations, equations reducible to quadratic equations. *Sequence and Series:* Arithmetic, geometric and harmonic progressions. *Permutation and combinations*: Introduction to permutation and combinations, *Binomial Theorem:* Introduction to binomial theorem. *Trigonometry:* Fundamentals of trigonometry, trigonometric identities. *Graphs:* Graph of straight line, circle and trigonometric functions.

2. ***Statistics*:** *Introduction*: Meaning and definition of statistics, relationship of statistics with social science, characteristics of statistics, limitations of statistics and main division of statistics. *Frequency distribution*: Organisation of data, array, ungrouped and grouped data, types of frequency series, individual, discrete and continuous series, tally sheet method, graphic presentation of the frequency distribution, bar frequency diagram histogram, frequency polygon, cumulative frequency curve. *Measures of central tendency*: Mean medium and modes, quartiles, deciles and percentiles. *Measures of dispersion*: Range, inter quartile deviation mean deviation, standard deviation, variance, moments, skewness and kurtosis.

Recommended Books:

Swokowski, E. W. (1986) *Fundamentals of Algebra and Trigonometry* (6th edition), PWS-Kent Company, Boston

Kaufmann. J. E., '*College Algebra and Trigonometry*', PWS-Kent Company, Boston, Latest Edition.

Walpole, R. E., '*Introduction of Statistics*', Prentice Hall, Latest Edition.

Wilcox, R. R., '*Statistics for the Social Sciences'*,

Annexure - E

INTRODUCTION TO STATISTICS

Credit hrs: 3(3-0)

Unit 1. What is Statistics?

Definition of Statistics, Population, sample Descriptive and inferential Statistics, Observations, Data, Discrete and continuous variables, Errors of measurement, Significant digits, Rounding of a Number, Collection of primary and secondary data, Sources, Editing of Data. Exercises.

Unit 2. Presentation of Data

Introduction, basic principles of classification and Tabulation, Constructing of a frequency distribution, Relative and Cumulative frequency distribution, Diagrams, Graphs and their Construction, Bar charts, Pie chart, Histogram, Frequency polygon and Frequency curve, Cumulative Frequency Polygon or Ogive, Historigram, Ogive for Discrete Variable. Types of frequency curves. Exercises.

Unit 3. Measures of Central Tendency

Introduction, Different types of Averages, Quantiles, The Mode, Empirical Relation between Mean, Median and mode, Relative Merits and Demerits of various Averages. Properties of Good Average, Box and Whisker Plot, Stem and Leaf Display, definition of outliers and their detection. Exercises.

Unit 4. Measures of Dispersion

Introduction, Absolute and relative measures, Range, The semi-Inter-quartile Range, The Mean Deviation, The Variance and standard deviation, Change of origin and scale, Interpretation of the standard Deviation, Coefficient of variation, Properties of variance and standard Deviation, Standardized variables, Moments and Moments ratios. Exercises.

Unit 5. Probability and Probability Distributions.

Discrete and continuous distributions: Binomial, Poisson and Normal Distribution. Exercises

Unit 6. Sampling and Sampling Distributions

Introduction, sample design and sampling frame, bias, sampling and non-sampling errors, sampling with and without replacement, probability and non-probability sampling, Sampling distributions for single mean and proportion, Difference of means and proportions. Exercises.

Unit 7. Hypothesis Testing

Introduction, Statistical problem, null and alternative hypothesis, Type-I and Type-II errors, level of significance, Test statistics, acceptance and rejection regions, general procedure for testing of hypothesis. Exercises.

Unit 8. Testing of Hypothesis- Single Population

Introduction, testing of hypothesis and confidence interval about the population mean and proportion for small and large samples, Exercises

Unit 9. Testing of Hypotheses-Two or more Populations

Introduction, Testing of hypothesis and confidence intervals about the difference of population means and proportions for small and large samples, Analysis of Variance and ANOVA Table. Exercises

Unit 10. Testing of Hypothesis-Independence of Attributes

Introduction, Contingency Tables, Testing of hypothesis about the Independence of attributes. Exercises.

Unit 11. Regression and Correlation

Introduction, cause and effect relationships, examples, simple linear regression, estimation of parameters and their interpretation. r and R^2. Correlation. Coefficient of linear correlation, its estimation and interpretation. Multiple regression and interpretation of its parameters. Examples

Recommended Books:

Walpole, R. E. (1982) "Introduction to Statistics", 3rd Ed., Macmillan Publishing Co., Inc. New York.

Muhammad, F. (2005) "Statistical Methods and Data Analysis", Kitab Markaz, Bhawana Bazar Faisalabad.

Note: ***General Courses from other Departments***

Details of courses may be developed by the concerned universities according to their Selection of Courses as recommended by their Board of Studies.