

# SCHEME OF STUDIES

## MS/M.Phil & Ph.D SCHEME OF STUDIES IN GEOGRAPHY 2022 ONWARDS



DEPARTMENT OF GEOGRAPHY & GEOMATICS  
UNIVERSITY OF PESHAWAR

MS/M.PHIL & PH.D COURSES IN GEOGRAPHY

Course	Course Title	Credit
<b>RELATED /MINOR COURSES</b>		
Geog: 701	Advanced Research Methods	4
Geog: 702	Advanced Geostatistics	4
Geog: 703	Principle and Interpretation of Aerial Photos	3
Geog: 704	Geographic Information System (GIS)	3
Geog: 705	Remote Sensing (RS)	3
Geog: 706	Advance Quantitative Geography	3
Geog: 801	Seminar	2
Geog: 802	Geography of Khyber Pakhtunkhwa	4
<b>MAJOR COURSES</b>		
Geog: 711	Climatic Types of Pakistan	3
Geog: 712	Land Forms of Pakistan	3
Geog: 713	Soil Studies	4
Geog: 714	Pleistocene Geomorphology of the Vale of Peshawar	3
Geog: 715	Morphology of Hill Slopes	3
Geog: 721	Political Geography	4
Geog: 722	Studies of Landuse Pattern in Pakistan	3
Geog: 723	Geography of Resources	4
Geog: 724	Rural Geography, Planning & Development	4
Geog: 725	Agricultural Geography	4
Geog: 726	Transportation Geography	4
Geog: 731	Geography & National Planning	4
Geog: 732	Town Planning	4
Geog: 733	Advance Environmental Planning & Management	4
Geog: 734	Disaster Planning & Management	4
Geog: 736	Rangeland Management	4
Geog: 737	The Geography of Water Resources	4
Geog: 811	Sedimentation and Stratigraphy	4
Geog: 812	Structural Geology	4
Geog: 813	Stratigraphy of Pakistan	4
Geog: 814	Geomorphic Process of the Himalayan Foot Hills	4
Geog: 821	Recreational Geography	3
Geog: 822	Geography of Irrigation	4
Geog: 823	Geography of Marketing	4
Geog: 824	Population Geography of Pakistan	4
Geog: 831	Geography of Housing	3
Geog: 832	Advance Environmental Impact Assessment	4
Geog: 833	Metropolitan Planning	4
Geog: 834	Common Property Resource Management Systems	4
Geog: 835	Computer Aided Cartography	4
Geog: 836	Medical Geography	4
Geog: 837	Mountain Geography	4
Geog: 838	Biogeography	3
Geog: 839	Advanced Remote Sensing	3
Geog: 840	Geography of Tourism and Recreation	3
Geog: 841	Climate Change	3
Geog: 842	Gender Geography	3
Geog: 843	Advanced Geo-information Technology	3
Geog: 844	Urbanization and Urban Sprawl	4
Geog: 845	Forest Resources and Conservation Measures	4
Geog: 846	Geography of Drought and Desertification	4
Geog: 848	Integrated Urban Water Management	4
Geog: 849	Disaster Resilience and Recovery	3

## **RELATED/MINOR COURSES:**

### **ADVANCE RESEARCH METHODS**

Geog: 701

Cr. Hours-4

General Introduction: The nature of research Approaches: Ethnographic, Survey and experimental style. Basic Elements of Scientific Research methods; Hypothesis testing, variables/parameters. Methods of Data Collection: Questionnaire Design; Data Classification and type i.e. categorical, ordinal and Interval. Sampling methods and frame; Use of statistics; frequency, measure of dispersion and central tendency, correlation and regression, Contingency tables etc. writing a thesis.

#### ***BOOKS RECOMMENDED:***

1. Lyne Tucker, et.al.(1990) “Research Methods and statistical Analysis”, IPS; Nottingham University U.K.
2. Howard, K.ef. Sharp, J.A. (1983) “The Management of a student Research Project”, Gower Publishing Company, UK.
3. Keelinger, Fred N. (1986) “Foundation of Behavioural Research”, New York, CBA Publishing Japan Ltd.
4. Bannett, N. (1973) “ Research Design”, Milton Keynes, the open University, UK.

### **ADVANCED GEOSTATISTICS**

Geog-702

Cr. Hours-4

#### **Course Structure:**

Learning Objectives: This course teaches various advanced geostatistical methods through lab exercises and a final project.

Learning Outcomes: This course produces skills of application of these geostatistical tools and methods in analyzing the geodata in applied research

#### **Course Outline:**

Introduction to Spatial statistics; Data – spatial & non-spatial; Feature and geographic spaces; Basic statistics: Univariate description: Frequency Tables and Histograms, Cumulative Frequency Tables and Histograms, Normal distribution; Transformations: Logarithmic transformation; Square root transformation; Angular transformation; Logit transformation; Summary Statistics, Measures of Spread, Measures of Shape; Bivariate description: Comparing Two Distributions, Scatterplots, Correlation, Linear Regression Exploring and visualizing spatial data: Spatial description; Data Postings, Contour Maps, Symbol Maps; Indicator Maps; Moving Window Statistics; Proportional Effect; Spatial Continuity; h- Scatterplots; Correlation Functions; Covariance Functions; Variograms; Cross h-Scatterplots

Modeling the Sample Variogram: Basic Permissible Models; Circular, Spherical, Exponential, Gaussian, Linear; Fitting models; Omnidirectional variogram modelling; Modelling the Anisotropy Axes; Choosing the Directional Tolerance; Relative Variograms; Cross-Variograms

Estimation: Weighted Linear Combinations; Global and Local Estimation; Point and Block Estimates; Random Function Models

Interpolation: Deterministic vs Geostatistical interpolation: Kriging: types of Kriging; Simple Kriging, Ordinary Kriging, Stratified Kriging, Block Kriging, Indicator Kriging, Empirical Bayesian Kriging; Co-kriging; Cross Validation

**Lab:** Practical exercises with R or Geostatistical Analyst of ArcGIS.

***BOOKS RECOMMENDED:***

1. Atkinson, P. M. and Lloyd, C. D. (Eds.). (2010). geoENV VII – Geostatistics for Environmental Applications: Quantitative Geology and Geostatistics Volume-16: Springer, London.
2. Delfiner, P., and Chiles, J-Paul. (2012). Geostatistics: Modeling Spatial Uncertainty (2nd ed.): John Wiley & Sons Ltd., Hoboken, United States.
3. Hengl, T. (2009). A Practical Guide to Geostatistical Mapping: University of Amsterdam, Luxembourg (ISBN: 978-92-79-06904-8).
4. Isaaks, E. H. and Srivastava, R. M. (1989). Applied Geostatistics: Oxford University Press, Inc., New York.
5. Jiang, B, and Yao X. (Eds.). (2010). Geospatial Analysis and Modelling of Urban Structure and Dynamics: Springer, London.
6. McKillup, S. and Dyar, M. D. (2010). Geostatistics Explained: An Introductory Guide for Earth Scientists: Cambridge University Press, Cambridge, UK
7. Webster, R. and Oliver, M.A. (2007). Geostatistics for Environmental Scientists (2nd ed.): John Wiley & Sons Ltd., England.

**PRINCIPLES AND INTERPRETATION OF AREAL PHOTOS**

Geog: 703

Cr. Hours-3

Development of photo interpretation, Factors governing photographic image quality, Fundamentals of photo interpretation, Photo interpretation in Geology Geomorphology, Geography, Forestry, Agriculture, Urban area analysis

***BOOKS RECOMMENDED***

1. R.N. Golwell      Manual of photographic Interpretation  
New York 1960
2. A.W. Judge      Stereoscopic photography: It application to  
industry and education. London 1950
3. V.C. Millner &      Photogeology, London 1961  
C.F. Millner

**GEOGRAPHIC INFORMATION SYSTEM (GIS)**

Geog: 704

Cr. Hrs. 3

**CONTENTS:** Introduction to GIS, principles and concepts of GIS, GIS database management and development, GIS data sources, digitization of data/output, management, manipulation, analysis, modeling output and organization, new way of looking GIS data and GIS technology, need for trained individuals, introduction of ILWIS or Arc GIS or MapInfo or Arc View or ERDAS GIS software. Digitization of point, line and polygon, GIS for analysis, Application of GIS as a tool in development projects e.g. Agriculture,

land use planning, forestry and wildlife management, archaeology, geology, socio-economic and municipal, environmental management and monitoring, change detection, global scale application.

### ***BOOKS RECOMMENDED:***

1. Aronoff, S. (1989) "Geographic Information System: A management perspective" W.D.L. publishers, Ottawa.
2. Aronoff, S. (2005) "Remote Sensing for GIS Managers". ESRI Press, New York.
3. Bernhardsen, T. (1992) "Geographic Information System" Viak IT, Myrene, Norway.
4. Burrough, P.A (latest edition) "Principles of Geographical Information Systems for land resources assessment". Clarendon Press, Oxford.
5. Clark, K.C. (1997) "Getting started with GIS". Prentice Hall, New York.
6. Lillesand, H., Kiefer, M., and Ralph. W. (1994) "Remote Sensing and Image Interpretation". John Wiley Sons, Inc. New York.
7. Maginr, D.J. (1991) "Geographic Information System". Longman, London.
8. Masser, I. and Blakemore, M. (1991) "Handling Geographical Information: Methodology and Potential Applications". Longman. New York.

## **REMOTE SENSING (RS)**

Geog: 705

Cr. Hrs. 3

**Objectives:** This course is designed to make students aware about the basic concepts regarding remote sensing data capturing, classification, analysing, monitoring and mapping for geo-information production.

### **CONTENTS:**

- i. Introduction: Remote Sensing, Electromagnetic Radiation Electromagnetic Spectrum, Interactions with the Atmosphere, Radiation, Passive versus. Active Remote Sensing, Characteristics of Images.
- ii. Sensors: Sensors (on the Ground, in the Air, in Space), History of remote sensing, satellite characteristics, pixel size and scale, spectral resolution, radiometric resolution, temporal resolution, cameras and aerial photography, multi- spectral scanning, thermal imaging, geometric distortion, weather satellites, land observation satellites, marine observation satellites, other sensors, data reception.
- iii. Image Analysis: Introduction, visual interpretation, digital processing, pre-processing, enhancement, transformations and classifications

### ***BOOKS RECOMMENDED:***

1. Aronoff, S. (2005) "Remote Sensing for GIS Managers". ESRI Press, New York.
2. Canada Centre for Remote Sensing (2005) "Fundamentals of remote sensing". Remote Sensing Tutorial, Natural Resources, Canada.
3. Carleton A. (1990) "Satellite Remote Sensing in Climatology". CBS publishers and distributor, New Delhi
4. Carter D.J. (1986) "The remote sensing". McCarta LTD, London
5. Davis S.(1978) "Remote Sensing the Quantitative approach" McGraw-Hill New York.

6. European Space Agency (1988) "Remote Sensing moving towards the 21<sup>st</sup> century". Proceeding of International Geosciences and Remote Sensing Symposium. 12-16 September 1988 Volume I, Edinburgh U.K
7. Lillesand, T.M. (2006) "Remote sensing and image interpretation". John Wiley & Sons, Inc. New York.
8. Michael H.R. (1986) "Remote Sensing method and application". John Wiley and Sons Inc. New York.

### **Advance Quantitative Geography**

Geog. 706

Cr. Hour-3

#### **Learning Objectives**

This course is aimed to train the students to identify and apply the advanced quantitative techniques in data collection, classification and interpretation/analysis.

#### **Learning outcome**

After the completion of this course the students will be able to:

- understand the overall concept of Quantitative Geography
- Understand the application of a various techniques in Quantitative Geography at various stages of research cycle.

#### **COURSE CONTENTS:**

##### **Geo-Statistical Concepts of Quantitative Geography**

###### **1. Data Collection and Sources**

- Published and Unpublished statistics
- Maps, Aerial Photographs and Satellite Images
- Historical sources
- Surveys, reports. Working papers, Directories

##### **Spatial Analysis and Summarizing Data**

###### **1. Grouping techniques**

- Histograms
- Frequency polygons
- Relative & Cumulative Histograms

###### **2. Measures of Central Tendency in Spatial Context**

- Measures of Dispersion
- The Normal Distribution
- Skewness and Kurtosis

###### **3. Spatial Analysis and Comparisons**

- Purely descriptive comparisons
- Hypothesis Testing
- Inferential Explanatory Comparisons:
  - i. A Runs test for randomness
  - ii. The Mann-Whitney U test
  - iii. Students T test
  - iv. The Chi square test
  - v. Analysis of Variance

###### **4. Spatial Relationships**

- Correlation
- Co-Variance
- The Product moment coefficient 'r'
- Spearman rank correlation
- The Point-Bi serial correlation

## 5. Trends and Spatial Prediction

- Regression (Simple)
- Regression (Multiple)
- Uses and application of Geo-statistical tools and techniques

### BOOKS RECOMMENDED :

1. Cramer, D. (2003). Advanced quantitative data analysis. McGraw-Hill Education (UK).
2. Harris, R. (2016). Quantitative geography: The basics. Sage. Publisher
3. Yano, K. (2000). GIS and quantitative geography. Geo Journal, 52(3), 173-180.
4. Wang, F. (2006). Quantitative methods and applications in GIS. CRC Press.
5. Ebdon, David (1977). Statistics in Geography: A Practical approach
6. Toyne P. Peter T. N., & Hammond, R. (1971). Techniques in Human Geography.
7. Mc. Cullagh P.S. (1982). Quantitative Techniques in Geography, An Introduction

### SEMINAR

Geog: 801

Cr. Hrs. 2

Seminar on different Geographical topics

### GEOGRAPHY OF KHYBER PAKHTUNKHWA

Geog: 802

Cr. Hours-4

1. Location, Brief History of Khyber Pakhtunkhwa.
2. Physiographic, Climate, vegetation of Khyber Pakhtunkhwa
3. Cultural Environment of Khyber Pakhtunkhwa
4. Natural and Human Resources of Khyber Pakhtunkhwa.

### BOOKS RECOMMENDED

1. Geography of N.W.FP., by David Dichter, 1960
2. Official Report of the various department of the Government of N.W.F.P.

## MAJOR COURSES:

### CLIMATIC TYPES OF PAKISTAN

Geog: 711

Cr. Hours-3

1. Composition of the atmosphere
2. Annual distribution of insolation, Temperature and pressure
3. Types of air mass and its distribution on the surface of the earth
4. A brief of study of prevailing, seasonal and local winds
5. A detail study of the regional and seasonal distribution of precipitation, rainfall reliability and areas of drought.
6. Effectiveness of precipitation, and precipitation, regions of Pakistan

#### **BOOKS RECOMMENDED**

- |    |              |                             |                  |
|----|--------------|-----------------------------|------------------|
| 1. | W.C. Kendrew | Climates of the continents  | Oxford           |
| 2. | H.Riehl      | Tropical Meteorology        | London 1954      |
| 3. | H.Arakawa    | World Survey of Climatology | Tokyo 1969       |
| 4. | Trewartha    | Introduction to Climate     | New York<br>1969 |

### LAND FORMS OF PAKISTAN

Geog: 712

Cr. Hours-3

Geological background of Pakistan., Distribution of major landforms of Pakistan.  
Landform characteristics: Relation to lithology, and past and present climates, the effects of the Pleistocene changes in climate.  
Geomorphological processes of the past and present. Chronology of landform development

#### **BOOKS RECOMMENDED**

1. Geology of India, D.N. Wadia, London 1957
2. Landforms, soil and landuse of the Toronto, 1958, India Plain
3. A Geography of Pakistan K.U.Kuraishy, Karachi 1978
4. A Geography of India and Pakistan O.K.Spate, London 1976

### SOIL STUDIES

Geog: 713

Cr. Hours-4

Architecture of Soil, Chemistry of Soil, Soil population i.e. flora and fauna. Humans. Soil classification, Soil problems with special reference to Pakistan

#### **BOOKS RECOMMENDED**

1. The Study of the Soil in the Field, G.RR.Clake, Oxford 1957
2. Soil, G.V.Jacks, London 1967
3. Soil, classification, A comprehensive 7<sup>th</sup> approximation Washington System D.C. 1960
4. The World of the soil, E.H.Russell, London 1957



## **PLEISTOCENE GEOMORPHOLOGY OF THE VALE OF PESHAWAR**

Geog: 714

Cr. Hours-3

Geological background of the vale of Peshawar, Principle landforms of the vale characteristics and distribution of the surface deposits. Genesis of the surface material i.e. the geomorphological processes and Chronology. The Pleistocene climatic changes and their effect on the processes and landforms.

### ***BOOKS RECOMMENDED***

1. Geology of India, D.N.Wadia, London 1957
2. Studies on the Ice Age in India and H.De.Terra & T.T.Paterson Association Human Cultures, New York 1939
3. Soils of the Vale of Peshawar, Lahore 1964, Soil Survey of Pakistan
4. Landforms, soil and Landuse of the Indus Plain, Toronto, 1958

## **MORPHOLOGY OF HILL SLOPES**

Geog: 715

Cr. Hours-3

Hillslope characteristics: Features of Slopes, control of the hillslopes, relationship to lithology. Hillslope processes: Mass movement, overland flow. The effect of climate and lithology on the form of hillslopes. Slope forms in different region.

### ***BOOKS RECOMMENDED***

1. Geology of India, London 1957
2. Fluvial Geomorphology, L.B.Leopold, M.G.Wolman & J.P.Miller, London 1964

## **POLITICAL GEOGRAPHY**

Geog 721

Cr. Hours-4

1. Political Geography: Concept and application.
2. Methods of Political Geographers.
3. The State and the Nation.
4. The State, its territory, Frontiers and Boundaries.
5. The Territorial Sea.
6. Core Areas and the Capital City.
7. Politics and Transportation.
8. Resources and Power.
9. Geographical aspects of relations between states.
10. Political Geography of Rivers.
11. The Political Geography of Rivers.
12. The Political of Foreign Trade.
13. The Politic Geography of International Organizations.

### ***BOOKS RECOMMENDED***

1. Politics and Geographic Relationships, W.A.Douglas Jackson, 1964
2. Geography and Politics in a divided World 1964
3. Political Geography, Norman J.G.Pounds
4. Political Geography, J.R.V.Prescott, 1972
5. Geography and the State, R.J.Johnston, 1982

## STUDIES OF LANDUSE PATTERN IN PAKISTAN

Geog: 722

Cr. Hours-3

1. Scope and object of Landuse studies.
2. History of Landuse studies.
3. Landuse categories in Pakistan
4. Access and Accessibility as Factors in the use of land.
5. The surface from and underground structure of the earth crust and their role.
6. The influence of relief climate and soil on landuse. (a) Influence of cultural factors.
7. Types of farming.
8. Farms and farm units.
9. Fertility, productivity and classification of land.
10. Basic Principles of landuse planning.

### ***BOOKS RECOMMENDED***

1. Land utilization, Methods & Problems of Research, Kostrowie K.J. 1962  
Warsazawa
2. Landuse Analysis, Inter-India publication, Jainendra Kumar 1986, New Delhi
3. Pakistan Census of Agriculture, 1960-70-80.
4. L.D.Stamps, the land of Britain its Uses and misuses, 1962

## GEOGRAPHY OF RESOURCES

Geog 723

Cr. Hours-4

:

1. Importance and scope of the study of Resources.
2. Resources and their appraisal.
3. Energy and Resources.
4. Resources of Agricultural.
5. Resources of Industries.
6. Resources and Economic Development.
7. Conservation of Resources and Protection of Environment.

### ***BOOKS RECOMMENDED***

1. Zimmermaxs World Resources and Industries Constatin, W.N.Peach. James A
2. Earth Resources, Brain J. Skinner
3. Population resources Environment, Paul R.Ehrlich
4. Using the Worlds Wealth, Helen G. Thomas
5. Environmental Conservation, R.F.Dasman
6. Resources and Man, National Academy of Sciences U.S.A

## **RURAL GEOGRAPHY, PLANNING & DEVELOPMENT**

Geog: 724

Cr. Hours-4

Rural Geography as a field of study. Types and patterns of rural settlements with particular reference to Pakistan. Broad issues and problems of Rural Planning and development. Rural Development in Pakistan.

### ***BOOKS RECOMMENDED***

Clout : Rural Geography  
Jackson : Surveys for Town and Country Planning  
Pard : Rural Development and Basic need.  
Pault J.Cloke : An introduction to RRural settlement  
Planning (1983) Keith Huggart & : Rural Development  
(A Geographical Perspective) 1987  
Henry Buller

## **AGRICULTURAL GEOGRAPHY**

Geog: 725

Cr. Hours-4

1. Nature of Agricultural Geography
2. The Origin and Development of Agriculture
3. Physical Factors Influencing Agriculture
4. Social and Economic factors influencing Agriculture
5. Agricultural Enterprises and Systems
6. Regional Analysis

### ***BOOKS RECOMMENDED***

1. Agricultural Geography, Leslie Symons. Frederrick, A Preager, New York 1967
2. Agricultural Geography, W.B.Morgan and R.J.G. Muston Published by Methuen & Co. Ltd. 1971
3. American Geography, Inventory and Published by the Prospects Association of American Geographer 1954
4. Agricultural Geography, P.B.Tiwari 1986

## **TRANSPORTATION GEOGRAPHY**

Geog: 726

Cr. Hours-4

Transportation Geography as a field of study, its nature and scope, Basic elements of transportation systems, distance and interaction and diffusion of transport net work. Connectivity and accessibility analytical study of Geography theory. Types of road network. Intercity and intercity connectivity, traffic and freight flows. Basic Survey, Transport and Regional Economy, use of simulation techniques in for casting flows and designing of freeway

### ***BOOKS RRECOMMENDED***

1. Traffic : Transportation Geography

2. Chorrly : Network Analysis in Geography
3. Haggett & Chorly : Socio-Economic Models in Geography 1983

## **GEOGRAPHY AND NATIONAL PLANNING**

Geog: 731 Cr. Hours-4

Geography and Planning: Types of Planning at Micro and Microm Scale. Developmental Plans and growth strategies. Geographic and Economic theories for economic development Planning policies and spatial imbalances of economic health.

### ***BOOKS RECOMMENDED***

1. Freeman T.W. Geography & Planning (1968)
2. Stamp D Applied Geography
3. Hall P Regional Planning and
4. Freedman Alonso Regional Planning and
5. Isard Methods of Regional Analysis

## **TOWN PLANNING**

Geog: 732 Cr. Hours-4

Natural and Scope of Town Planning, Classical concepts of Town Planning, Modern concepts. Elements and Factors in Town Planning. Basic Survey for Town Planning: Physical Landuse, Demographic Socio-Economic and Traffic Surveys. Delimitation of Slums, Urban Renewal, New Towns and Plans

### ***BOOKS RECOMMENDED***

Cullingworth, Town and Country Planning, (1990)

## **ADVANCE ENVIRONMENTAL PLANNING AND MANAGEMENT**

Geog: 733 Cr. Hours-4

Scope of Environmental Planning, Development of concepts. Planning theories. Environment & its components, Nature vs man made Environment: Physical, Biological & Cultural Components. Man- Environmental inter action in time & space, relationship of Culture, Technology and resources use, world conservation strategy and National Conservation strategy. Current Environmental problems: in Global perspective and in Pakistan.

### ***BOOKS RECOMMENDED***

1. Wagner, H.W., Environmental and Man
2. Asian Development Bank, Environmental Planning Theory
3. Faludi, A(Ed), 'A' Reader in Planning Theory, Latest Edition 1990

## **DISASTERR PLANNING & MANAGEMENT**

Geog: 734 Cr. Hours-4

1. Introduction to the Disaster Planning. A Question of Balance
2. Forces of nature, acts of man.
3. Droughts: Too little water

4. Floods.
5. Tropical Cyclone & other winds-Earthquakes, Volcanoes, Landslides.
6. Relief, disaster and development

### ***BOOKS RECOMMENDED***

Natural Disasters, Acts of God or acts of man, Wijkman, A. and Timberlake, L. (1984)

## **RANGELAND MANAGEMENT**

Geog. 736

Cr. Hours- 4

Learning objectives: To create awareness among the students regarding the importance of Rangeland resources and to stimulate students for conducting applied research in the various aspects of rangeland management with particular reference to Pakistan.

### Course outline:

- Scope status and historical evaluation of the subject
- Introduction to Rangelands
- Importance of rangelands as a resource
- Rangeland resources; products and potentials a global perspective
- Utilization of Rangelands
  - o Agriculture
  - o Animal husbandry
  - o Medicinal herbs
  - o Handicrafts etc.
- Subsistence livelihood and the role of rangelands in rural areas
- Agro-pastoral economy
- Pastures productivity and utilization mechanisms
- Human and social issues related to agro-pastoral practices in gender perspectives
- High altitude rangelands in Pakistan
- Pastoral production system in the high altitude rangelands of Pakistan

Assignment: Identification through mapping of Rangeland types, resources and current status.

### ***BOOKS RECOMMENDED:***

1. Heady HF, Child RD (1994) Rangeland ecology and management. Westview Press, Inc. Boulder, USA.
2. Holechek JL, Pieper RD, Herbel CH (1995) Range management: principles and practices. Prentice-Hall, Englewood Cliffs, New Jersey
3. ICIMOD (2000) Rangeland management and livestock feeding strategies in Karakoram Region, Pakistan. Special publication, ICIMOD Kathmandu, Nepal
4. Ning W, Rawat, GS, Joshi S, Ismail M, Sharma E (Eds.), (2013) High altitude rangelands and their interfaces in the Hindu Kush Himalayas. ICIMOD, Kathmandu, Nepal

5. Wriqth IA, Duncan AJ (Eds.), (2005) Livestock, fodder, pastures and people; an integrated study in the northern areas of Pakistan. ICIMOD, Kathmandu, Nepal
6. Vallentine JF (1989) Range development and improvements. Academic Press, Inc. San Diego, USA

## **THE GEOGRAPHY OF WATER RESOURCES**

Geog. 737

Cr. Hours: 04

Learning objectives: To create awareness the students about the global water resources, its distribution and reserves. To make the students conscious about the threats faced by the fresh water resources and its solution.

### Course outline:

- Scope, contents and history of Geography of Water Resources
- Global water resources classification
- Global renewable water resources
- World water use and availability
- Regional Water resources, water use and water availability
- Threats to Global water resources including Climate change
- Future of world water resources
- Methods of assessing and forecasting global water use and water availability

### ***BOOKS RECOMMENDED:***

1. Biswas, A. K. (2005). An Assessment of Future Global Water Issues. *International Journal of Water Resources Development*, 21(2), 229-237.
2. Cai, X., & Rosegrant, M. W. (2002). Global Water Demand and Supply Projections -- Part 1. A Modeling Approach. *Water International*, 27(2), 159-169.
3. Gleick, P. H. (2003). Global Freshwater Resources: Soft-Path Solutions for the 21st Century. *Science*, 302(5650), 1524-1528. doi: 10.1126/science.1089967
4. Gleick, P. H., Cain, N. L., Haasz, D., Henges-Jeck, C., Hunt, C., Kiparsky, M., Wolff, G. H. (2004). *The World's Water 2004-2005: The Biennial Report on Freshwater Resources*: Island Press, Washington, D.C.
5. Gleick, P. H., Singh, A., & Shi, H. (2001). *Emerging Threats to the World's Freshwater Resources: A Report of the Pacific Institute for Studies in Development, Environment, and Security*, Oakland, California.
6. Hoekstra, A. Y. (2006). *The Global Dimension of Water Governance: Nine Reasons for Global Arrangements in Order to Cope with Local Water Problems Value of Water Research Report Series No. 20*. [http://www.unesco-ih.org/content/download/2714/27847/file/Report20-Global\\_Water\\_Governance.pdf](http://www.unesco-ih.org/content/download/2714/27847/file/Report20-Global_Water_Governance.pdf)
7. Miller, G. W. (2006). Integrated concepts in water reuse: managing global water needs. *Desalination*, 187(1-3), 65-75.
8. Rosegrant, M. W., & Cai, X. (2002). Global Water Demand and Supply Projections -- Part 2. Results and Prospects to 2025. *Water International*, 27(2), 170-182.
9. Shiklomanov, I. A. (2000). Appraisal and Assessment of World Water Resources. *Water International*, 25(1), 11 - 32.

10. Shiklomanov, I. A., & Rodda, J. C. (2003). World Water Resources at the Beginning of the 21<sup>st</sup> Century. Cambridge, UK: Cambridge University Press.
11. UNESCO-WWAP. (2009). The United Nations World Water Development Report 3: Water in a Changing World: Paris: UNESCO, and London: Earthscan.
12. Verkerk, M. P., Hoekstra, A. Y., & Gerbens-Leenes, P. W. (2008). Global Water Governance: Conceptual Design of Global Institutional Arrangements Value of Water Research Report Series No. 26. <http://www.unesco-ihc.org/content/download/2720/27865/file/Report26-Verkerk-et-al-2008GlobalWaterGovernance.pdf>

### **SEDIMENTATION AND STRATIGRAPHY**

Geog: 811

Cr. Hours-4

1. Properties of Sedimentary rocks, Texture, colour structure and chemical composition
2. Classification and description of Sedimentary rocks
3. Sedimentary Process, Weathering, Transportation, Abrasion and deposition
4. Sedimentary Environments. Environmental patterns and their application in Stratigraphy Classification of Sedimentary environments
5. Sedimentary Tectonics, classification and Tectonic cycles and relationship with stratigraphy
6. Stratigraphic analysis

#### ***BOOKS RECOMMENDED:***

1. Stratigraphy and Sedimentation, W.C. Krumbein & L.L.Sloss
2. Stratigraphic principles and practice J.Marvin Weller Harper &, Row N. York
3. Origin of Sedimentary rocks, H.Blatt, G.Middleton & Raymond Murrery, Published by Prentic Hall Inc. Englewood Clifts, New Jersey (1972)

### **STRUCTURAL GEOLOGY**

Geog: 812

Cr. Hours-4

1. Depositional textures and structures, Markerr bed stratigraphic break, Unconformity types and its characteristics, Criteria to recognized in field. Description of folds. types and characteristics.
2. Joints cleavage, Fracture, Lineation and sheeting.
3. Faults and their types, geometrical and generic classification. Creiteria to recognize in the field.
4. Igneous activities, Volcanoes and their types and topographic and their types and recognition. Pluton

#### ***BOOKS RECOMMENDED***

1. Structural Geology, M.P.Billings published by Pakistan National Books Foundation 1975
2. Sedimentary Rocks, F.J. Patty Jogn, Harper Row Brothers, New York, 1976

## STRATIGRAPHY OF PAKISTAN

Geog: 813

Cr. Hours 4

1. Precambrian rocks of Pakistan, example from various parts of Pakistan. Cambrian rocks of Pakistan, Origin of Salt Range, formation of its stratigraphic place in the geological Column. Environment of Cambrian deposition in salt range and Trans Indus Range.
2. Ordovician and Silurian rocks of Kashmir and Hazara. Siluro-Devonian of Chitral, Kashmir, Nowshera, Khyber Agency and Hazara.
3. Gondwana System, life during the deposition of rocks belonging to Gondwana system. Late palaeozoic Era to the start of Mesozoic Era.
4. Distribution of Oligocene in Sind, Baluchistan, Punjab and NWFP. Dower micocene Murree formation in Punjab & NWFP and their equivalent in Sind & Baluchistan. Environment analysis of the Murree formation. Middle Miocene, a detailed discussion on the petrology, condition of deposition, climate condition, Organic remains of strata.
5. Pleistocene and recent strata of Pakistan, comparison with potwar, Nizam Pur and Karewa series of Kashmir. The Glacial age in Indo-Pakistan, Pleistocene deposits in Pakistan. The Indo genetic Alluvium and its lithological properties study of various types of soils.

### **BOOKS RECOMMENDED:**

1. Geology of India, D.N.Wadia, 1957
2. Geology of India, M.S.Krishnan
3. Stratigraphy of Pakistan, Geological Survey of Pakistan Quetta

## GEOMORPHIC PROCESSES OF THE HIMALAYAN FOOT-HILLS

Geog: 814

Cr. Hours-4

Geological background, of the Himalayan Ranges. Endogenic processes of the past and present: the tectonic history of the Himalayas, the impact of the Alpine Orogeny on the landforms, diastrophism during the Pleistocene and Holocene periods. Igneous activity and its effect on landform.

Oxygenic processes of the past and present: Degradational and A gradational processes, the effects of the climatic changes during Pleistocene on the slope development.

### **BOOKS RECOMMENDED:**

1. Geology of India, D.N.Wadia, London 1957
2. Ice Ages & Ancient Human Cultures De Terran & Patterson, in India, Washington 1938
3. Hillslope Forms & Processes, M.A. Carson & M.J.Kirk.Cambridge, 1976



## RECREATIONAL GEOGRAPHY

Geog: 821

Cr. Hours-3

Location of recreational areas: Landscape, scenic beauty and potential of recreational cities.

Analytical study of structure and spatial distribution of recreational facilities. Role of Tourism in Pakistan's economy.

### **BOOKS RECOMMENDED:**

1. The use of land of Recreation, Mc Murry, K.C.
2. The Business of Recreation, Brown, R.M.
3. The Tourism industry of a North wood's country, Prophet, E.C. Economic Geography
4. Part-time Farming and Recreational land use in, Greekey, R.B. New England
5. Tourism and Recreation in the West Zierer, C.B

## GOEGRAPHY OF IRRIGATION

Cr. Hours-4

Geog: 822

1. Development of Irrigation:
  - i. Definition
  - ii. Imporrtnance
  - iii. History of Irrigation
  - iv. Types of
2. Agriculture and Irrigation
  - i. Need for irrigation
  - ii. Natural Endowment
  - iii. Irrigation and Landuse
  - iv. Irrigation and cropping pattern
  - v. Irrigation and farm size
3. Problems:
  - i. Water disputes
  - ii. Waterlogging and Salinity
  - iii. Water Pollution
  - iv. Multi-purpose projects

### **BOOKS RECOMMENDED:**

1. A World Geography of Irrigation, Cantor Leonord M. Edibburgh, Oliver and Boyd, 1967
2. A history of Landuse in Arid Region Stamp L.D. New York, UNESCO 1967
3. Irrigation Development and Public Policy, Roy E.Huffman, The Ronald Press Company New York
4. The Role of Irrigation in Pakistan, (Master Thesis) Department of Geography, Kansas State University, Kansas, U.S.A. 1969.
5. Economic Geography S.K. Sadhukhan. S.Chand & Co. Ltd. New Delhi 1986
6. Agricultural Geography, Leslie Symons. Frederick A Praeger, New York 1990
7. Economic Geography F.K. Khan, Oxford Press Londond, 1990

## GEOGRAPHY OF MARKETING

Geog: 823

Cr. Hours-4

Objectives: To train the students in the field of Marketing Geography both in urban and regional context and to develop their knowledge both theoretically/practically to understand related issues and problems particularly with reference to Pakistan.

Learning outcome:

At the conclusion of the course the M.Phil/PhD research scholars would be able to know the impact of various geographical, socio-economical and demographic factors on the location and functioning of urban and regional marketing centers, their patterns and trends.

Course outline:

- Nature, definition and scope of marketing geography.
- Location factors for marketing activities, geography of demand, supply, range goods and services, consumer behavior, complementary areas of markets and accessibility and distance decay.
- Theoretical basis of marketing geography, Walter Christaller's Central place theory, Christaller's modifications, Lösch's modifications, Berry and Garrison's modifications Weber's theory of industrial location, General interaction theory.
- Classification of market centers, Hierarchies of settlements based on centrality, hierarchies of the urban shopping centers and marketing regions.
- Urban whole sale and retailing, regional whole sale and retailing with examples from developed countries, south Asia and Pakistan.
- Planning issues, trade area analysis, process of selecting a new store location, use of GIS in site selection techniques and in decision support.
- Changes in the urban business pattern, changes in the North American city, concentration versus decentralization in Britain, the extent of decentralization in Britain.
- Virtual retail and the future of retailing in the light of information technology, e- retailing.

***BOOKS RECOMMENDED:***

Stephen Swales (Ed.) (2008).Marketing Geography (3rd.ed.), Boston: Pearson Custom Publishing.

Ross I. D. 1976. "Marketing Geography, with special reference to retailing. Methuen, London and New York.

David Dewar & Vanessa Watson. 1990. "Urban Markets: Developing Informal Retailing. Routledge London and New York.

Brian j. L. Berry. 1967. Geography of market centers and retail distribution. Prentice-Hall, Inc., Eaglewood Cliffs, N.J.

**POPULATION GEOGRAPHY OF PAKISTAN**

Geog: 824

Cr. Hours-4

Population distribution and redistribution in Pakistan. Geography aspects of selected population characteristics in Pakistan. Age, sex and Martial Status, Houshold and family structure, economic and Social Composition, Population dynamics in Pakistan. Fertility, Mortality and natural growth of population. Population movements in Pakistan internal and external migrations their languages and effects. Population growth, in Pakistan, History, theory and Policy.

***BOOKS RECOMMENDED:***

1. Population Geography of the Developing World, Clerk J.
2. Migration Urbanization and Environment in Pakistan, Khan A.
3. Population of Pakistan, Afal M.

## **GEOGRAPHY OF HOUSING**

Geog: 831

Cr. Hours-3

### **HOUSING SYSTEM**

1. Housing and Households
2. Linkages, mobility and Dynamics
3. Opportunity and Orientation in Housing
4. Sectors of the Housing System. Public Sector, Owner-occupied Sector, Private Sector
5. Institutions and Access to Housing
6. The Nature of Housing Policy
7. Housing Policy and Housing System

### ***BOOKS RECOMMENDED:***

1. The Geography of Housing. Bourne, L.S. (1981)
2. Housing Policy and Housing System, Murie, Alan, Niner, Pat Waston Christopher (1976)
3. Housing by People, Turnerr, John. F.C. (1976)

## **ADVANCE ENVIRONMENTAL IMPACT ASSESSMENT (AEIA)**

Geog: 832

Cr. Hours-4

1. Scope and meaning of EIA – Evolution of (EIA). Environmental Impact statement (EIS). Environmental Impact of human activities. Role of EIA & EIS in forward Planning and Sustainable Development
2. Steps and Procedure of Environmental Impact assessment.
3. Methods of Environmental Impact assessment. e.g. Check Lists, Environmental, Evaluation System (EES), Matrices, Network, overlays, Environmental Indices, cost benefit analysis, Manuals and Models.
4. Environmental Impact Assessment in Planning Practice: will it work in Pakistan

### ***BOOKS RECOMMENDED:***

1. The Role of Environmental Impact, Clark, Michael & Assessment in the Planning Process, Herington, John 1988
2. Planning outlook Vol 24, Issue No.3 1978
3. EIA Guidelines for Planner and UN/Escape (1985) Decision Makers

## **METROPOLITAN PLANNING**

Geog: 833

Cr. Hours-4

Nature and Scope of Metropolitan Planning. Studies in the Planning of one metropolitan Area in Pakistan its growth and structure. Analysis and procedures used in Planning and Organizing the development of primate cities.

### ***BOOKS RECOMMENDED:***

1. Megalopolis, G.Gotman
2. City in the newly developing Country, Breese
3. Cities of the World, Hall,P.
4. Spatial Organization, Abler etal

### **COMMON PROPERTY RESOURCE MANAGEMENT SYSTEMS**

Geog 834

Cr. Hrs 04

Objectives: To familiarize the students with the concept of commons in general and to provide an in depth knowledge on the subject with particular reference to the research conducted on this subject in the world. Local situation will be highlighted and most of the examples will be given from Pakistan.

Learning outcome: With the successful completion of this course the M.Phil /PhD research scholar would be able to know the functioning of common property resource management systems in the rural settings. They will also get an in-depth knowledge on the functioning of the decentralized community organizations in different parts of Pakistan.

#### **Course Contents**

1. Scope and status of the subject
2. Basic definitions
3. History of research on the commons
4. Tenure issues in common property management systems
5. Three influential models in the study of common property systems a. Tragedy of the commons
- b. The prisoner's dilemma
- c. The logic of collective action
6. Indigenous institutions for self-organizations and self-governance
7. Characteristics of the common property resource management systems
8. Case studies of success in the common property management systems
- a. Pasture resources
- b. Water resources
- c. Forest resources
- d. Marine resources
9. Institutional changes and responses of the communities utilizing common property resources
10. Failure case studies and their causes
11. Latest trends and direction of research in this field
12. Design principles of the long-lasting CPRS

### ***BOOKS RECOMMENDED:***

1. ADAMS, W.M., D. BROCKINGTON, J. DYSON & B. VIRA (2003): Managing Tragedies: Understanding Conflict over Common Pool Resources. In: Science 302, 1915-1916.

2. ARNOLD, J.E.M. & W.C. STEWART (1991): Common Property Resource Management in India. Oxford Forestry Institute, Department of Plant Sciences, University of Oxford, U.K. (= Tropical Forestry Papers 24)
3. BERKES, F., D. FEENY, B.J. McCAY & J.M. ACHESON (1989): The Benefits of the Commons. In: Nature 340, 91-93.
4. BERKES, F. (Ed.): (1989): Common Property Resources: Ecology and Community-based Sustainable Development. London.
5. BROMLEY, D.W. (1991): Environment and Economy: Property Rights and Public Policy, Cambridge.
6. BROMLEY, D.W. (Ed.): (1992): Making the Commons Work. Theory, Practice, and Policy. California.
7. BROMLEY, D.W. & M.M. CERNEA (1989): The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies. Washington D.C. (= World Bank Discussion Paper 57)
8. CIRIACY-WANTRUP, S.V. & R.C. BISHOP (1975): "Common Property" as a Concept in Natural Resources Policy. In: Natural Resource Journal 15, 713-727.
9. DIETZ, T., N. DOLŠAK, E. OSTROM & P.C. STERN (2002): The Drama of the Commons. In: NATIONAL RESEARCH COUNCIL (Ed.): The Drama of the Commons: Committee on the Human Dimension of Global Change. Washington.
10. FEENY, D., F. BERKES, B.J. McCAY & J.M. ACHESON (1990): The Tragedy of the Commons: Twenty-two Years Later. In: Human Ecology 18(1), 1-19.
11. HARDIN, G. (1968): The Tragedy of the Commons. In: Science 162, 1243-1249.
12. McKEAN, M.A. (1992): Success on the Commons: A Comparative Examination of Institutions for Common Property Resource Management. In Journal of Theoretical Politics 4(3), 247-281.
13. MEYERS, L.R. (Ed.): (1989): Innovation in Resource Management. Proceedings of the Ninth Agricultural Sector Symposium. The World Bank, Washington D.C.
14. OSTROM, E. (1990): Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge.
15. OSTROM, E., J. BURGER, C.B. FIELD, R.B. NORGAARD & D. POLICANSKY (1999): Revisiting the Commons: Local Lessons, Global Challenges. In: Science 284, 278-282.
16. SCHLAGER, E. & E. OSTROM, (1992): Property-rights Regimes and Natural Resources: A Conceptual Analysis. In: Land Economics 68(3), 249-262.
17. The ECOLOGIST (1992): The Commons: Where the Community has Authority. In: The Ecologist 22(4), 123-130.

### **COMPUTER AIDED CARTOGRAPHY**

Geog: 835

Cr. Hrs 04

Objectives: To train the students in digital cartography, advanced map interpretation and use of graphics. Practical assignments will be conducted to enable the students for map preparation map reproduction and publication.

Learning outcome: By the end of the course the M.Phil /PhD research students would be able to represent spatial data on maps and diagrams. Their analytical capabilities of maps and other graphics will also improve. Moreover, they will be able to draw suitable maps and diagrams by using the Freehand software.

### **Course Contents**

1. Introduction and scope of the subject
2. Importance of cartography as a tool for representing qualitative and quantitative data
3. Use and selection of different symbols for the representation of data on the map
4. The power of graphics
5. New trends in cartography
6. Development of digital cartography
7. GIS versus computer cartography
8. Software for digital cartography and mapping
9. Introduction of Freehand for digital cartography and mapping
10. Detail exercises on Freehand version 10 to enable the students for drawing maps, diagrams and cartograms from the base maps and original drawings

### ***BOOKS RECOMMENDED:***

1. MONKHOUSE, F.J. & H.R. WILKISON (1963): Maps and Diagrams, Their Compilation and Construction. London (Latest Edition)
2. RAISZ, E. (1948): General Cartography. McGraw-Hill London. (Latest Edition)
3. RAISZ, E. (1962): Principles of Cartography. McGraw-Hill London. (Latest Edition)
4. ROBINSON, A.H., MORRISON, J.L, MUHRCKE P.C., KIMERLING A.J. & S.C. GUPTILL (1995): Elements of Cartography. John Wiley and Sons New York. (6<sup>th</sup> Edition)
5. ROBINSON, A. (1963): Elements of Cartography. John Wiley and Sons New York. (3<sup>rd</sup> Edition)
6. SINGH, R.L. (1960): Elements of Practical Geography. Allahabad. (Latest Edition)

## **MEDICAL GEOGRAPHY**

Geog: 836

Cr. Hrs 04

Objectives: To introduce the field of Medical geography to M.Phil and PhD research students and to highlight the geographical, socio-economic and demographic factors affecting the health and health facilities.

Learning outcome: By the end of the course the M.Phil /PhD research scholar would be able to know the impact of various geographical, socio-economic and demographic factors that affect the health condition of the people and health facilities.

### **Course Contents**

- I. Introduction to Medical Geography:  
Definitions, Status, themes, concepts, Nature & scope of Medical Geography

The Historical Development of Medical Geography, medical geographic data and its presentation, spatial definition, Medicine and Medical geography, traditional medical system and cultural framework

II. Factors influencing the Patterns of Health facilities & Disease: Disease diffusion Geographical Factors.

Physical Factors / Environmental Factors. Cultural Factors.

Socio – Economic & Political Factors.

III. Patterns & Processes of Health & Disease: Spatial variations in health & welfare patterns including mapping. Role of Geography in exploring the impacts of diseases. Models in Medical Geography: Epidemiological Transition and use of computer and mapping in medical geography; Health & inequalities.

Global Patterns of health & Disease. Global Eradication of disease.

IV. Progress in Medical Geography: Recent Issues & Developments in Medical Geography. GIS, Remote Sensing & Health studies. Changing Societies & future Health care. Geography, Health care & Planning.

### ***BOOKS RECOMMENDED:***

1. Izhar, F. (2004). "Geography & Health: A study in medical Geography", A.P.H. Publishing corporation New Delhi.
2. Leninan, J.& Fletcher, W.W. (1976). Health & the Environment, 1<sup>st</sup> edition, Blacker & Sons Ltd. Glasgow.
3. Lloyd, J. (2002) Health & welfare, Holder & Stoughton London.
4. McGlashan, N.D (199?) "Medical Geography: Techniques and field Studies", latest edition, Methuen & Co Ltd, London
5. Cockcroft, A; Omer, K, Khan, A et al. (2005) "Social Audit of governance and delivery of Public services: Lasbela, Khairpur, Khanewal Sialkot & Haripur Districts 2005 Preventive Child Health" CIET & Districts Government

### ***Further Reading***

1. Centers for Disease Control, Enteric Disease Branch, Division of Bacterial and Mycotic Diseases. 1992. Update: Cholera -- Western Hemisphere, 1991.
2. Journal of the American Medical Association. Vol. 267 no. 10: 1320. Mata, Leonardo. "Cholera El Tor in Latin America, 1991-1993" in Disease in Evolution, Global Changes and Emergence of Infectious Diseases, Mary E. Wilson, Richard Levins, Andrew Spielman (editors). The New York Academy of Sciences, New York. pp. 55-68.
3. Frerichs, Ralph R., 2000. Dr. John Snow: a Historical Giant in Epidemiology. (<http://www.ph.ucla.edu/epi/snow.html>)
4. Glass, Roger I., et al. 1991. Cholera in Africa: Lessons on Transmission and Control for Latin America. The Lancet. Vol. 338, Sept 28, 791-795.
5. Reyna, Carlos and Antonio Zapata. 1991. Crónica sobre el cólera en el Perú. Desco: Centro de Estudios y Promoción del Desarrollo.
6. Seas, C., J. Miranda, A. I. Gil, R. Leon-Barua, J. Patz, A. Huq, R. R. Colwell, and R. B. Sack. 2000. New Insights on the Emergence of Cholera in Latin America During 1991: The Peruvian Experience. American Journal of Tropical Medicine and Hygiene 62 (4): 513-517.
7. Tauxe, Robert V. and Paul A. Blake. 1992. Epidemic Cholera in Latin America.

Journal of the American Medical Association. Vol. 267 no. 10: 1388-1390.

8. Webb, Richard and Graciela Fernández Baca de Valdez. 1990[?]. Peru en numeros, 1990. Cuánto S.A.
9. Webb, Richard and Graciela Fernández Baca de Valdez. 1992. Peru en numeros, 1992. Cuánto S.A.
10. Wolford, Kathryn. 1991. Peru in the Time of Cholera. The Christian Century. October 23, 1991.

## **MOUNTAIN GEOGRAPHY**

Geog: 837

Cr. Hrs 04

Objectives: To train the students in mountain environment and development related issues and problem particularly with reference to Pakistan.

Learning outcome: with the successful completion of this course the M.Phil /PhD research scholar would be able to understand the significance of mountain as part of the complicated terrestrial ecosystem and development related issues in the mountainous region of Pakistan.

### **Course Contents**

1. Introduction and Historical Development of Research in the Mountains
2. Physical Characteristics of Mountains
3. Scope and Status of Mountain Geography
4. History and Development of the Subject
5. Himalayan Dilemma
6. Paradigm Change in Mountain Research
7. The Recognition of Mountain as Fragile Environment by the UN
8. Agenda 21
9. Mountain Resources in General
10. Livelihood Strategies and Creative Adjustment Mechanisms
11. Physical Linguistic and Ethnic Diversity in the Northern Mountainous Belt of Pakistan
12. Resource Base and Resource Management Systems
13. Mountain As Water Tower
14. Changes and Transformation in the Region with Particular Reference to Socio-economic and Cultural Aspects
15. Accessibility
16. Out Migration
17. Resource Potential of the Mountains
18. Major Constraints for the Sustainable Development of the Region
19. A Brief Review of the Initiatives Taken by the State and NGOs for the Development of Mountainous Regions. Examples will be given from Pakistan.



### **BOOKS RECOMMENDED:**

1. ALLAN, N.J.R., G.W. KNAPP & C. STADEL (Eds.): (1988): Human Impact on Mountains. Totowa, New Jersey.
2. BASHIR, E. & ISRAR-UD-DIN (Eds.): (1996): Proceedings of the Second International Hindukush Cultural Conference. Karachi. (= Hindukush and Karakorum Studies 1).
3. DITTMANN, A. (Ed.): (2000): Mountain Societies in Transition. Contributions to the Cultural Geography of the Karakorum. Köln. (= Culture Area Karakorum Scientific Studies 6).
4. FUNNELL, D. & R. PARISH (2001): Mountain Environment and Communities. Routledge, London.
5. EHLERS, E. & H. KREUTZMANN (Eds.): (2000): High Mountain Pastoralism in Northern Pakistan. Stuttgart. (= Erdkundliches Wissen 132).
6. IVES, J.D. & B. MESSERLI (1989): The Himalayan Dilemma: Reconciling Development and Conservation. Routledge, London and New York.
7. JODHA, N.S., M. BANSKOTA & T. PARTAB (Eds.): Sustainable Mountain Agriculture. Vol. 1& 2. New Delhi.
8. KREUTZMANN, H. (Ed.): (2000): Sharing Water: Irrigation and Water Management in the Hindukush - Karakoram - Himalaya. Karachi.
9. MESSERLI, B. & J.D. IVES (Eds.): (1999): Mountains of the World. A Global Priority. New York, London.
10. STELLRECHT, I. (Ed.): (1998): Karakorum – Hindukush – Himalayas: Dynamics of Change. Köln. (= Culture Area Karakorum Scientific Studies 4. Vol I & II).
11. STELLRECHT, I & H.-G. BOHLE (Eds.): (1998): Transformation of Social and Economic Relationships in Northern Pakistan. Köln. (= Culture Area Karakorum Scientific Studies 5).
12. STELLRECHT, I. & M. WINIGER (Eds.): (1997): Perspectives on History and Change in the Karakorum, Hindukush and Himalaya. Köln. (= Culture Area Karakorum Scientific Studies 3). Mountain Research and Development from Vol. 1 to the latest

## **BIOGEOGRAPHY**

Geog: 838

Cr. Hrs 03

Learning objectives: To study the spatial variation of earth life in productivity, ecosystems and distinctiveness of biota specially focusing on latitudinal, depth and altitudinal diversity over the continents and oceans.

### **Contents:**

1. Introduction and history of Biogeography: Definition, relationship with other sciences, basic principles, scope and status, historical development, biogeography in nineteenth and twentieth century, present day biogeography.
2. Environmental setting: Earth's physical environments: Lithosphere, Hydrosphere, Atmosphere and the Biosphere, Geographic coordinate system, Geographic regions, mapping.

3. The changing earth and Biogeographic processes: Dispersal and mechanism of movement, Nature of barrier and dispersal routes, Geological Time Scale, Continental Drift Theory, Earth tectonic history, Climatic and biogeographic consequences of plate tectonic, Biogeographic dynamics.
4. Terrestrial biomes: Tropical rainforests biomes, Tropical dry forests biomes, Tropical savannas biomes, Desert biomes, Temperate grasslands biomes, Mediterranean woodland and scrub land biomes, Temperate broad leaf deciduous forests area biomes, Boreal forest biomes and Tundra biomes.
5. Hydro biomes: Fresh water biomes including rivers, streams, lakes and ponds. Marine Biomes including coastal, continental shelf and deep-sea biomes.
6. Human-dominated biomes: The state of world population, Human use of earth, Earth capacity to support humans, spatial and temporal pattern of population, Population trends in the new century, urban and agro-ecosystems, conservation of environment in the urban and agro-ecosystems.

### **References**

7. Groombridge, B. (1992) "Global Biodiversity: Status of the earth's living resources". Chapman and Hall, London.
8. IUCN and Government of Pakistan (GoP) (1992) "National conservation strategy". IUCN Pakistan and Government of Pakistan, Karachi.
3. Lomolino, M.V., Riddle, B. R. and Brown, J.H. (2006) "Biogeography". Sinauer Associates, Inc. publishers, Massachusetts.
4. Marsh, W.M. and Grossa, J. (2005) "Environmental Geography: Science, Land use and Earth systems" Jhon Wiley & sons, Inc. Hoboken.
5. Mollett, J.A. (1984) "Planning for agricultural development". CROOM HELM, London.
6. Singh, S. (2006) "Environmental Geography". Prayag Pustak Bhawan, India.
7. Woodward, S.L. (2003) "Biomes of the earth: Terrestrial, aquatic and human dominated". Greenwood press, U.S.A.

## **ADVANCED REMOTE SENSING**

Geog: 839

Cr. Hrs 03

Learning Objectives:

To make students understand in using high-resolution multispectral data, sophisticated image processing software, theory and application of image processing techniques.

### **Contents:**

Introduction to advanced remote sensing, Remote sensing and earth energy budget, Electromagnetic spectrum and radiation, Physical foundation of visible, Infrared and microwaves remote sensing, high and low resolution remote sensing, Theoretical explanation of reflection, absorption and transmission, High resolution multi-spectral data, advanced image processing software, Theory and application of image processing techniques, Accuracy testing, Height measurement techniques, Area measurement techniques, image enhancements, Advanced techniques of Geometric data correction, Advanced techniques of Atmospheric data correction, Advanced techniques of Radiometric data correction, transformations and classification.

### ***BOOKS RECOMMENDED:***

1. Aronoff, S. (2005) "Remote Sensing for GIS Managers". ESRI Press, New York.

2. Canada Centre for Remote Sensing (2005) "Fundamentals of Remote Sensing". Remote Sensing Tutorial, Natural Resources, Canada.
3. Carleton .A. (1990) "Satellite Remote Sensing in climatology". CBS publishers and distributor, New Delhi
4. Carter D.J. (1986) "The Remote Sensing". Mc Carta LTD, London
5. Davis .S. (1978) "Remote sensing the Quantitative approach". McGraw-Hill New York
6. European Space Agency (1988) "Remote Sensing moving towards the 21<sup>st</sup> century". Proceeding of international geosciences and Remote sensing Symposium.12-16 September 1988 volume I, Edinburgh U.K.
7. Lillesand, T. M. (2006) "Remote Sensing and image interpretation". John Wiley & Sons, Inc. New York
8. Michael H.R. (1986) "Remote Sensing method and application". John Wiley and sons Inc. New York.

## **GEOGRAPHY OF TOURISM AND RECREATION**

Geog: 840

Cr. Hrs 03

Objectives: To train the students in the emerging field of tourism and recreation and factors affecting this industry.

### Contents

1. Introduction and scope of the Subject
2. Historical Development of tourism industry in the world
3. Major Tourist generating and receiving regions of the world
4. Types of tourism
  - a. Adventure tourism b. Sport tourism
  - c. Cultural Tourism d. Religious Tourism e. Eco-tourism
5. Tourism Resources
  - a. Climate
  - b. Coastal areas and sea
  - c. Landscape and wildlife
  - d. Historic and cultural resources
6. Impacts of Tourism
  - a. Economic impacts b. Cultural impacts
  - c. Social and environmental impacts
7. Factor affecting tourism industry
  - a. Tourist facilities and infrastructure b. Political stability
  - c. Terrorism and security conditions
8. Tourism and economic development
9. Prospects, potential and problem of tourism in Pakistan with special reference to security and law and order situation.

### ***BOOKS RECOMMENDED:***

1. Burton R. (1995). Travel Geography. Pitman Publishing London (2<sup>nd</sup> Edition)
2. Davidson, R. (1989). Tourism. Pitman Publishing London
3. Hall, C.M. & Page, S.G. (2001). The Geography of Tourism and Recreation. London, New York: Routledge. (Reprint)
4. Harssel, J.V (1994). Tourism and Exploration. Prentice Hall, New Jersey. (3<sup>rd</sup> edition)
5. Lea, J. (1988). Tourism and development in the third world. London, New York: Routledge. Smith, S.L.J (1995). Tourism Analysis: A Handbook. Longman (2<sup>nd</sup> edition)

6. Williams S. (2009). Tourism Geography. A new synthesis. 2nd edition. London, New York: Routledge.
7. Journal and periodicals: Tourism Management Annals of Tourism Research
8. Mountain Research and Development
9. Journal of Mountain Science
10. Journal of Eco-tourism and etc.

## **CLIMATE CHANGE**

Geog: 841

Cr. Hrs 03

Learning Objectives: To educate the students in the phenomena of climate change, its impacts and responses at global level.

### **Contents**

1. Climate change: Trends in Climate Variables, Evidence of Climate Variability.
2. Global Warming Update, Uncertainties and precautionary principle, Sources and sinks of green house gases, Climate Variability (El Nino, La Nina).
3. Introduction to climate models used for predicting climate change at regional and international level.
4. Impact of Global warming on.
  - A: Ice sheets and glaciers, water resources and sea level rise.
  - B: sustainable development, forests, agriculture, land use and desertification, human health, tourism and natural hazards.
5. Climate change, sustainable development and Millennium Development Goals
6. Global Response to Climate Change Mitigation and Adaptation, Inter-governmental Panel on Climate Change (IPCC).
7. Climate change negotiations, Main elements of United Nations Framework Convention on Climate Change, Kyoto Protocol and various mechanisms adopted under it with particular emphasis on Clean Development Mechanism.
8. Climate change and Pakistan: Possible impacts on ecology and economics particularly water resources security, food security, energy security, human health and natural hazards.
9. Adaptation strategies and their importance for Pakistan, How to formulate adaptation strategies: case study at district level.

### **BOOKS RECOMMENDED:**

1. The Scientific Consensus on Climate Change, Science 306, 1686.POTUS and the Fish, Science 297, 477. Dealing with the Tinder As Well As the Flint, Science 294, 1789.
2. El Nino and the Science of Climate Prediction, Consequences 5(2), 2-15. A Few Good Climate Shifters, Science 306, 599.
3. The Ice Record of Greenhouse Gasses, Science 259, 926-934.
4. Spencer Weart, Simple Models of Climate,  
<http://www.aip.org/history/climate/simple.htm>
5. Mcdougal littell, Climate Change Models Predict the Future,  
[http://www.classzone.com/books/earth\\_science/terc/content/investigations/esu501/esu501\\_page05.cfm](http://www.classzone.com/books/earth_science/terc/content/investigations/esu501/esu501_page05.cfm)
6. IPCC (2007) Fourth Assessment Report: Synthesis and summaries for Policy Makers of Working Group II and III
7. Jonathan Cowie, (2007). Climate Change Biological and Human Aspects.
8. Anthony David Owen, (2004). Economics of Climate Change
9. Pak Sum Low, (2005). Climate Change and Africa

10. Oxfam, (2009). Climate change in Pakistan: Stakeholder Mapping and Power Analysis.
11. Oxfam, (2009). Climate Change, poverty and Environmental Crises in the Disaster Prone Areas of Pakistan: Community-Based Research.
12. ICIMOD, (2009). Climate Change Impacts and Vulnerability in the Eastern Himalayas
13. John Wainwright and Mark Mulligan, (2004). Environmental Modeling: Finding Simplicity in Complexity.
14. Pakistan's Initial National Communication on Climate Change to UNFCCC, November, 2003, <http://unfccc.int/resource/docs/natc/paknc1.pdf>
15. J. Esper. J, Bosshard.A, and Winiger.M, (1995). "Tree Rings from the Upper Timberline in the Karakorum as Climatic Change Indicators for the last 1000 Years". In Dendrochronologia, 13, Pp79-88.

## **GENDER GEOGRAPHY**

Geog: 842

Cr. Hrs 03

### **Contents**

1. Gender Geography, status and scope; concepts and terminologies
2. Linkages between gender and sustainable development; why it is important to have gender inclusive sustainable development,
3. Sources and methodologies for gender related information and data collection.
4. Differential impacts on genders access to resources – food, fuel wood and water; crop and livestock production changes and their effects on gender division of labour.
5. Gender and environment. Important role of women in environmental conservation and safeguard.
6. Climate change and its impacts - How does climate change affect men and women differently? Gender specific impacts of climate change, associated natural disasters and their resulting environmental damages?
7. Spatial variation and gender disparity in education, health and other socio-economic variables in Pakistan
8. Mainstreaming gender into development process, incorporating gender issues in the full range of development policies, plans and programmes.
9. Gender issues in Pakistan. Important steps undertaken for gender mainstreaming -role of government, and media in mainstreaming gender in sustainable development in Pakistan

### **BOOKS RECOMMENDED:**

1. Acker, J. 1990. Hierarchies, jobs, bodies: a theory of gendered organizations. Gender and Society. 4: 139-158.
2. Agarwal, B. 1993. The Gender and Environment Debate. Feminist Studies 18 (1) 119-58.
3. Appelbaum, E. 1993. New technology and work organization: the role of gender relations. In B. Probert and B.W. Wilson (eds.), Pink Collar Blues: Work, Gender and Technology. Melbourne University Press, Melbourne, pp 60-84.
4. Adler, S. and J. Brenner. 1992. Gender and space: lesbians and gay men in the city. International Journal of Urban and Regional Research. 16: 24-34.
5. Appelbaum, E. 1993. New technology and work organisation: the role of gender relations. In B. Probert and B.W. Wilson (eds.), Pink Collar Blues: Work, Gender and Technology. Melbourne University Press, Melbourne, pp 60-84.

6. Blumen, O. 1994. Gender Differences in the Journey-to-Work. Urban Geography 15 (3): 223-45.
7. Lynne Brydon and Sylvia Chant (latest edition) Women in the third world. Gender Issues in the rural and urban areas. Routledge USA, Elgar Publishing limited UK London
8. Momsen JH (2004) Gender in development. Routledge London
9. Momsen JH (latest edition) Women and Development in the third world Routledge London
10. Ostegaard Lise (Eds) (latest edition) Gender and development. A practical guide. Routledge London
11. UNESCO, (2002). How to use the Gender Toolkit, Pp 41.
12. UNESCO, (2002). Gender Sensitivity, Pp 200 France
13. CIET International (2004) Social audit of abuse against women Final Report to Ministry of Women and Development Government of Pakistan, (Unpublished) CIET international,  
31 July [www.ciet.org](http://www.ciet.org)
14. Neil Andersson et. Al (2009) Collecting reliable Information about Violence against Women safely in Household Interview: Experience from a large-Scale National Survey in South Asia. SAGE Journal Violence Against Women, Vol.15 No.4 April 2009 pp 482-496

### **ADVANCED GEO-INFORMATION TECHNOLOGY**

Geog: 843

Cr. Hrs 03

**Objective:** This course would help students in understanding advanced geo-information technology such as spatial databases, accuracy assessment, database query, statistical analysis of spatial data, 2D and 3D spatial modeling.

**Course Outline:** Introduction to course, Co-ordinate Systems and Map Projection, GIS data models: Raster, vector and Hybrid, Data Rectification, Editing Cartographic Data, Visualization of Geospatial Data, Data management system, Symbolization and Map Layouts Development, 3D Visualization of Spatial Data, Geo-coding, Geodatabase development, advanced image classifications, Point spatial Analysis, Lines and Networks analysis, Performing Network Analysis, Area Objects and Spatial Autocorrelation, Analyzing Fields, Spatial Interpolations, Geo-statistical Analysis, Map Overlay Analysis, Multivariate Data, DEM extraction and development, 3-D development, spatial Modeling.

#### ***BOOKS RECOMMENDED:***

1. John Stillwell (2004) Applied GIS and Spatial Analysis John Wiley & Sons, Ltd. England  
ISBN: 0470844094.
2. Martien Molenaar (1998) An Introduction to the Theory of Spatial Object Modelling for GIS Taylor & Francis, Inc. ISBN: 074840774X.
3. Aronoff, S. (2004) "Geographic Information Systems: A Management Perspective", WDL Publications, Ottawa, Fifth Edition. ISBN - 0912804008
4. Clarke, K. (2004) "Getting started with Geographic Information System", Prentice Hall, New York, Second Edition. ISBN -1879102897

5. Heywood, I., Cornelius, S. and Carver, S. (2003) "An introduction to Geographic Information System", Addison Wesley Longman, New York, Second Edition. ISBN -0130611980
6. Burrough, P.(2002) "Principles of Geographic Information Systems for Land Resources Management", Oxford University Press, Oxford, Second Edition. ISBN - 0198233655
7. McDonald, R. and Burrough, P. (2001) "Principles of Geographic Information Systems", Oxford University Press, Oxford, Second Edition ISBN - 0198233855
8. Foresman, T. (1997) "The history of Geographic Information System", Prentice Hall, New York. ISBN – 0138621454.
9. Stewart Fotheringham, Chris Brunsdon, Martin E Charlton (2000) Quantitative Geography: Perspectives on Spatial Data Analysis SAGE Publications ISBN: 0761959483.
10. Jacek Malczewski (1999) GIS and Multi-criteria Decision Analysis John Wiley & Sons, Inc. ISBN: 0471329444.

## **URBANIZATION AND URBAN SPRAWL**

Geog. 844

Cr. Hours: 04

Learning objectives: To make student comprehend the process of urbanization and related problems and to equip them with adequate knowledge for conducting advance research on the issues related with urbanization and urban sprawl.

### Course outline

- Introduction, Scope and History of urbanization, Origin and spread of urbanization in the ancient time
- Establishment and Development of towns in Mesopotamia, Nile and Indus Valleys
- Emergence of urban system in Europe, Impact of Dark Ages on urbanization
- Renaissance and medieval towns, Pre-industrial cities and towns
- Industrial revolution and modern urbanization
- Spread of urban culture in the world
- Criteria for the definition of urban localities and related problems
- Global trends in urbanization,
- Differences in developed and under-development countries,
- Causes of urban growth and stages of urbanization Urban sprawl and its consequences
- Problems of urbanization: Poverty, shelter, transport, pollution, urban decay and conflicts
- Urban renewal: Policy matter, slum clearance and planning prospects in developing countries
- Challenges of urban management: finance, security etc.

Assignments: Mapping of urban sprawl, urbanization quota and rate for the world based on population reference bureau data.

### ***BOOKS RECOMMENDED:***

1. Albert Ferré, Tihamér Hazarja Salij, Actar (Ed) (2011) Total Housing: Alternatives to
2. Urban Sprawl edited by 2011
3. Bhatta B. (2010) Analysis of Urban Growth and Sprawl from Remote Sensing Data.
4. Springer

5. Bilborrow R. E. (Ed) (1998) Migration, Urbanization, and Development: New Directions and Issues. Kulwer Academic Publication, USA. United Nation Population Fund (UNEPA)
6. Bowman A., Wilson A. (Ed) (2011) Settlement, Urbanization, and Population. Oxford University Press UK
7. David C. Soule (Ed) (2006) Urban Sprawl: A Comprehensive Reference Guide. Greenwood Press USA
8. Gillham O. (2002) The Limitless City: A Primer on the Urban Sprawl Debate Island Press
10. Gerard A; Hugo C. G. (Ed) (2008) New Forms of Urbanization: Beyond the Urban-rural Dichotomy. Ashgate Company London
12. Osborne R Cunliffe B (Ed) (2005) Mediterranean Urbanization 800-600 BC Oxford University Press UK 2005
13. Roberts B and Kanaley T (Ed) (2006) Urbanization and Sustainability in Asia: Case Studies of Good Practice. Asian Development Bank
14. Robinson, K. (Ed.) (1998), Cities of the World. World Regional Urban Development. Harper & Row, New York, London. 2<sup>nd</sup> edition.
15. Wagner, L N (Ed) (2008) Urbanization: 21st Century Issues and Challenges Nova Science Publisher New York
16. Ye Lin (2008) Urban Sprawl, Amenities, and Quality of Life: Cities in the Twenty-first Century. VDM Publishers, Germany

## **FOREST RESOURCES AND CONSERVATION MEASURES**

Geog. 845

Cr. Hours: 04

Learning objective: To inculcate the students with the latest situation and coupling effects of deforestation at global level and to stimulate further research on that issue in Pakistan.

### Course outline

- Introduction, scope and significance of the Subject
- Constraints affecting natural Forest
  - o Biophysical and demographic development
  - o Topography, Climatic constraints
  - o Ownership related problems
  - o Management associated constraints
- Types of forest
- Dynamic of forest resources Ownership
- Regional variation in Private, State and Communal Ownership
- Social forestry projects and role of Non-Governmental organization
- Forest types geographical distribution and characteristics
- Uses of natural vegetation, timber, firewood etc.
- Problem and dynamics of deforestation
- Population growth and its impact on natural vegetation
- Institutional problems
- Trends in afforestation and deforestation data
- Causes, consequences and remedial measures



### **BOOKS RECOMMENDED:**

1. Ang A. (2006) Deforestation SCR Publisher. The University of Michigan. USA
2. Bosetti V. & Lubowski R. N. (Eds) (2010) Deforestation and Climate Change: Reducing Carbon
3. Brown K & Pearce D W (Eds.) (1994) The Causes of Tropical Deforestation: The Economic Ives, J. & Pitt D. C. (1988) Deforestation: Social dynamics in watersheds and mountain Ecosystems Routledge.
4. Fairhead J. & Leach M. (1998) Reframing Deforestation: Global Analyses and Local Realities: Studies in West Africa. Routledge, London.
5. Jepma C. J. (1995) Tropical Deforestation: A Socio-economic Approach Earthscan. UK
6. Hernandez Oscar Gilberto Cardenas (2008) Causes and Consequences of Deforestation and Land-cover Change in Rural Communities of Western Mexico. University of Wisconsin-Madison, United States.
7. Rahman F, Haq F, Tabassum I, et al. (2014) Socio-economic drivers of deforestation in Roghani Valley, Hindu-Raj Mountains, Northern Pakistan. Journal of Mountain Science 11(1):167-179. DOI: 10.1007/s11629-013-2770-x
8. Robinson BE, Holland MB, Naughton-Treves L (2013) Does secure land tenure save forests? A meta-analysis of the relationship between land tenure and tropical deforestation. Global Environmental Change (In press). DOI: 10.1016/j.gloenvcha.2013.05.012.
9. Spilsbury R. (2010) Deforestation Crisis can the earth survive? The Rosen Publishing Company New York.
10. Spilsbury R.(2012) Deforestation Development or Destruction. The Rosen Publishing Company, New York.
11. Spray S. L. & Moran M. D. (Eds.) (2006). Tropical Deforestation. Rowman & Littlefield.
12. Vajpeyi D. K. (2001) Deforestation, Environment, and Sustainable Development: A Comparative Analysis Greenwood Publishing

## **GEOGRAPHY OF DROUGHT AND DESERTIFICATION**

Geog. 846

Cr. Hours: 04

Learning objective: To train the students in understanding drought and desertification dynamics at Global regional and local levels. Stimulate the students to conduct innovative research in the various facets of dryland management with particular reference to Pakistan.

### Course outline:

- Scope status and importance of the subject
- Introduction to Drylands: Definitions, concepts and environmental characteristics of Drylands (rainfall, temperature, winds, humidity, soils, natural vegetation etc)
- Natural resource base of the Drylands
  - o Land: Agricultural and Rangeland
  - o Water
  - o Natural vegetation cover and its biodiversity
- Major Drylands of Pakistan and their importance
- o Major environmental hazards of Drylands:
- Drought and Desertification: Natural and anthropogenic causes, consequences

- Measures to combat drought and desertification in the drylands of Pakistan
- o Recovering the degraded lands
- o Dry zone reforestation
- o Rain water harvesting and surface water development strategies
- Human adaptation and community based strategies in dryland environment
- Impact of Drought and Desertification on development with special reference to Pakistan.

### **BOOKS RECOMMENDED**

1. Dregne HE (2002) Land Degradation in the Drylands. Taylor and Francis Online Publishers. DOI:10.1080/153249802317304422
2. Hussain I, Abu-Rizaiza SO, Habib MA, Ashfaq M (2008) Revitalizing a traditional dryland water supply system: the Karezes in Afghanistan, Iran, Pakistan and the Kingdom of Saudi Arabia. Taylor and Francis Online Publishers. DOI:10.1080/02508060802255890
3. Le Houérou HN (1996) Climate change, drought and desertification. Journal of Arid Environment 34(2):133-185
4. Mirza SN, Athar M, Qayyum M (2009) Effect of Drought on Rangeland Productivity and Animal Performance in Dryland Region of Balochistan, Pakistan. Agriculturae Conspectus Scientificus (ACS), Vol.74 No.2. Available online: <http://hrcak.srce.hr/39340>
5. Potter RB, Potter V (1978) Urban development in the world dryland regions: Inventory and prospects. Geoforum 9(6):349-379
6. Sen AK, Kar A (Eds.), (1993) Desertification and its control in the Thar, Sahara and Sahel Regions. Scientific Publishers, Jodhpur, India.
7. Shah BH (2006) Field Manual on the Role of Water Harvesting for Dryland Management in Pakistan. Inter-cooperation, Pakistan
8. Spooner B, Mann HS (Eds.), (1982) Desertification and development: dryland ecology in social perspective. Academic Press, London, UK
9. Stringer LC, Dyer JC, Reed MS, Dougill MJ, Twyman C, Mkwambisi D (2009) Adaptations to climate change, drought and desertification: local insights to enhance policy in southern Africa. Environmental Science and Policy 12(7):748-765
10. Tewari AK (Eds.), (1988) Desertification: Monitoring and Control. Scientific Publishers, Jodhpur, India.

## **INTEGRATED URBAN WATER MANAGEMENT**

Geog. 848

Cr. Hours: 04

Learning objectives: To educate students in the fields of water supply, sewerage and storm water management in urban areas. To develop innovative approaches towards the provision of sustainable and equitable municipal water and management of urban water.

### Course outline

- Introduction to the course: definitions, scope and status
- Components of urban water: Water supply, sewerage system, storm water drainage
- Sources and availability of fresh water in the urban areas
- Urban water management
- o Fresh water supply (sources, quality, network)

- o Sanitation
- o Sewerage
- o Storm water
  - Recycling and reuse of urban water
  - Social and economic aspects of urban water management
  - Major problems in water supply, sewerage and storm water in urban areas
  - Future scenario of urban water management in Pakistani cities
  - Municipal water uses: Domestic, Industrial, Commercial, Institutional
  - Water Budget: Demand, supply and consumption of urban water
  - Household level urban water management strategies
  - Sustainable decision support framework for urban water planning and management with special reference to Pakistan

***BOOKS RECOMMENDED:***

1. Abderrahman, W. A. (2000). Urban Water Management in Developing Arid Countries.
2. International Journal of Water Resources Development, 16(1), 7 - 20. Baumann, D. D., Boland, J . J., & Hanemann, W. M. (1998). Urban Water Demand Management and Planning: McGraw-Hill, New York.
3. Gleick, P. H. (2003). Waste Not, Want Not: The Potential for Urban Water Conservation in California, Oakland, California Retrieved from [www.pacinst.org](http://www.pacinst.org).
4. Heaney, J. P. (2000). Principles of integrated urban water management. In R. Field, J. P.
5. Heaney & R. Pitt (Eds.), Innovative Urban Wet-Weather Flow Management Systems (pp. 7-73). Lancaster: Technomic Publ Co Inc.
6. Heaney, J. P., Wright, L., & Sample, D. (2000). Sustainable urban water management. Lancaster: Technomic Publ Co Inc.
7. Sample, D. J., Heaney, J. P., Wright, L. T., & Koustas, R. (2001). Geographic information systems, decision support systems, and urban storm-water management. Journal of Water Resources Planning and Management-Asce, 127(3), 155-161.
8. Shamsi, U. M. (1996). Storm-water management implementation through modeling and GIS. Journal of Water Resources Planning and Management-Asce, 122(2), 114-127.
9. Zhang, C. J. (2004). A Study on Urban Water Reuse Management Modeling. (Master of Applied Science ), University of Waterloo, Ontario, Canada. Retrieved from <http://etd.uwaterloo.ca/etd/c22zhang2005.pdf>

**DISASTER RESILIENCE AND RECOVERY**

Geog: 849

Cr. Hrs: 3

Learning Outcomes: Upon successful completion of the course, the students shall be able to:

- i. Understand about the concepts of disaster resilience and early recovery.
- ii. Analyse various approaches adopted for disaster resilience and early recovery
- iii. Evaluate different approaches and frameworks of disaster resilience and recovery

## **Course Contents**

- Overview to course, disaster related concepts, Disaster Management Cycle
- Concept of Disaster Resilience and early Recovery
- Disaster Resilience
  - o Disaster Resilience
  - o Components of Disaster Resilience
  - o Assessment of Disaster Resilience
- Approaches and Models of Disaster Resilience
  - o Quantitative Models of Disaster Resilience.
  - o Qualitative Models of Disaster Resilience.
- Disasters and Mechanism of Early Recovery
- Gender and Disaster Management
- Mainstreaming Gender for Equitable Disaster Recovery
- Disaster Recovery as an Opportunity for Social Transformation
- Disaster Resilience and Disaster Recovery
- Women, Disaster Resilience and Recovery

## ***BOOKS RECOMMENDED:***

1. Birmingham, L., and D. McNeill (2012) *Strong in the Rain: Surviving Japan's Earthquake, Tsunami and Fukushima Nuclear Disaster*, (New York: Palgrave Macmillan).
2. Diane Archer and Somsook Booyabancha (2011) 'Seeing disasters as opportunities: harnessing the energy of disaster survivors for change,' *Environment and Urbanization*, 23: 351-365.
3. Douglas Paton, and David Johnston (2006) *Disaster Resilience: An Integrated Approach* (Springfield, Illinois: Charles C. Thomas, Publisher).
4. Frank Thomalla, Tom Downing, Erika Spanger-Siegfried, Guoyi Han and Johan Rockstrom, (2006) 'Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation,' *Disasters*, 30(1): 39 – 48.
5. Kathryn Gow and Douglas Paton (eds) (2008) *The Phoenix of Natural Disasters: Community Resilience* (Springfield: Charles C Thomas Publishers).
6. Lisa Schipper and Mark Pelling (2006) 'Disaster risk, climate change and international development: scope for, and challenges to, integration,' *Disasters*, 30: (1): 19 – 38.
7. UNDP (2007) *Human Development Report 2007/2008: Fighting Climate Change: Human Solidarity in a Divided World* (New York: UNDP)
8. UNDP (2014) *Human Development Report 2014: Sustaining Human Progress: Reducing Vulnerability and Building Resilience* (New York: UNDP).
9. UNISDR (2007) *Hyogo Framework for Action 2005 – 2015: Building the Resilience of Nations and Communities to Disasters* (KOBE: UNISDR).
10. UNISDR (2015) *Sendai Framework for Disaster Risk Reduction. 2015–2030* (SENDAI: UNISDR).