

CURRICULUM
OF
GEOGRAPHY
For
BS (Hons) & MS (Hons)

(Revised 2006)



HIGHER EDUCATION COMMISSION
ISLAMABAD

CURRICULUM DIVISION, HEC

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PREFACE

Curriculum of a subject is said to be the throbbing pulse of a nation. By looking at the curriculum one can judge the state of intellectual development and the state of progress of the nation. The world has turned into a global village; new ideas and information are pouring in like a stream. It is, therefore, imperative to update our curricula regularly by introducing the recent developments in the relevant fields of knowledge.

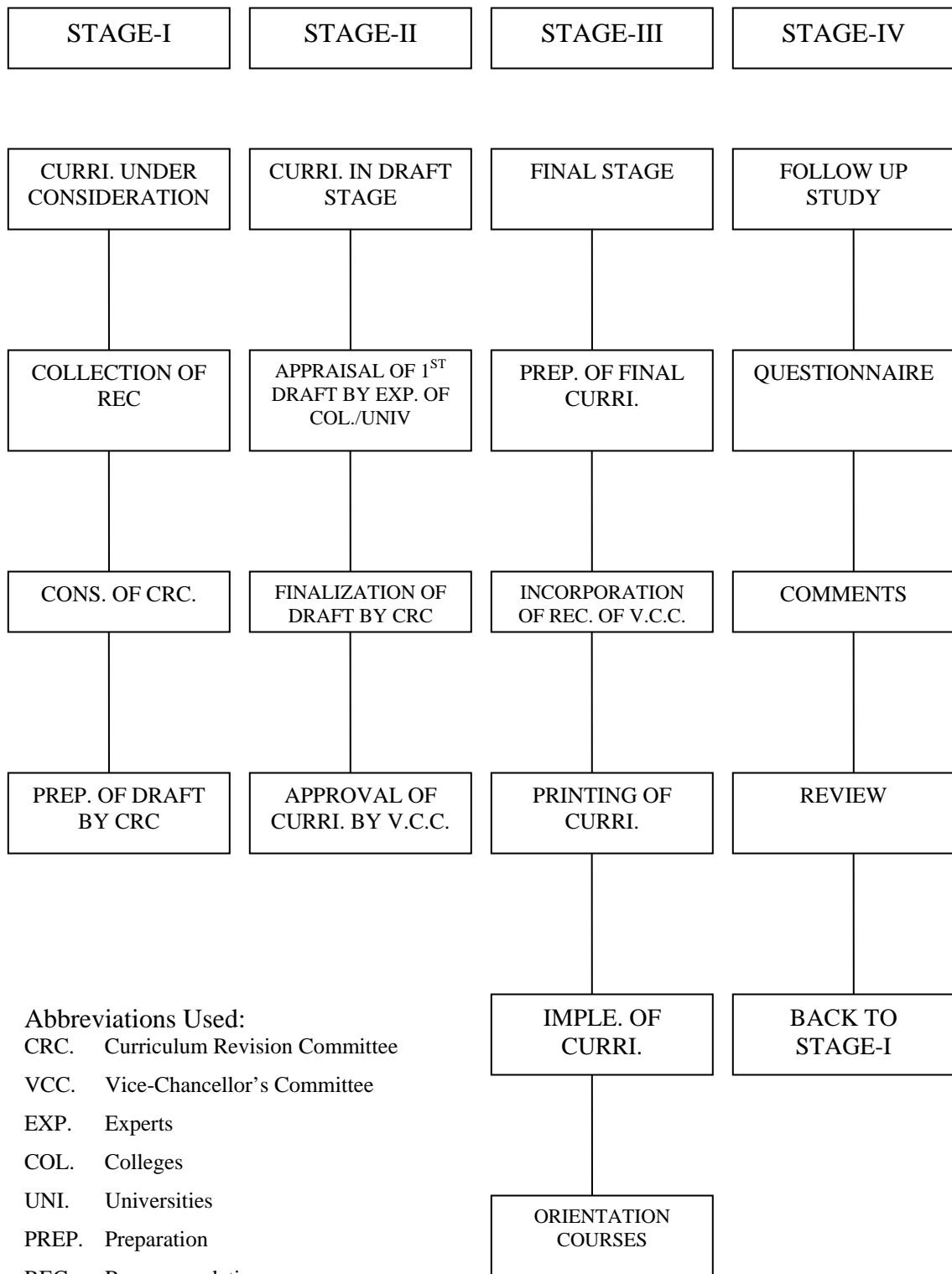
In exercise of the powers conferred by sub-section (1) of section 3 of the Federal Supervision of Curricula Textbooks and Maintenance of Standards of Education Act 1976, the Federal Government vide notification no. D773/76-JEA (Cur.), dated December 4, 1976, appointed University Grants Commission as the competent authority to look after the curriculum revision work beyond class XII at bachelor level and onwards to all degrees, certificates and diplomas awarded by degree colleges, universities and other institutions of higher education.

In pursuance of the above decisions and directives, the Higher Education Commission (HEC) is continually performing curriculum revision in collaboration with universities. According to the decision of the special meeting of Vice-Chancellors' Committee, curriculum of a subject must be reviewed after every 3 years. For the purpose, various committees are constituted at the national level comprising senior teachers nominated by universities. Teachers from local degree colleges and experts from user organizations, where required, are also included in these committees. The National Curriculum Revision Committee for Geography in its meeting held in April 6-8, 2006 at the HEC Regional Centre, Lahore revised the curriculum after due consideration of the comments and suggestions received from universities and colleges where the subject under consideration is taught. The final draft prepared by the National Curriculum Revision Committee duly approved by the Competent Authority is being circulated for implementation by the institutions.

(PROF. DR. ALTAF ALI G. SHAIKH)
Adviser (Acad/R&D)

August 2006

CURRICULUM DEVELOPMENT



INTRODUCTION

The Final meeting of the National Curriculum Revision Committee (NCRC) in Geography was held from 6-8th April 2006 at HEC Regional Center, Lahore to complete the draft curriculum prepared in its preliminary meeting held from 29th September to 1st October 2005.

The Committee drafted the final curriculum for BS (Hons) 4 year & MS (Hons) 2 year. The following experts participated; their names and address are given as under:

List of Participants

1. Dr. Amir Khan
Professor & Chairman,
Department of Geography and
Urban Regional Planning
University of Peshawar, Peshawar. Convener
2. Dr. Ms. Farhat Gulzar
Professor,
Department of Geography,
Punjab University, Lahore. Member
3. Mr. Muhammad Hanif
Professor & Ex-Principal Government Degree
College, Loralai (Balochistan) Member
4. Dr. Muhammad Nizamuddin
HEC Foreign Faculty Expert
University of the Punjab, Lahore. Member
5. Prof. Ms. Meher-un-Nisa Panwhar
Kashmir House, Jacob Road,
Hyderabad, Sindh Member
6. Dr. Gul Muhammad
Chairman & Associate Professor,
Department of Geography,
Federal Government Postgraduate College,
H-8, Islamabad Member
7. Mr. Ashhad Ahmad
Chairman & Associate Professor
Department of Geography
Forman Christian College, Lahore Member

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| 8. | Dr. Abdul Ghaffar
Chairman & Associate Professor
Department of Geography
University of the Punjab,
Lahore | Member |
| 9. | Mr. Muhammad Sharif Shaikh
Chairman & Associate Professor
Department of Geography
Shah Abdul Latif University,
Khairpur | Member |
| 10. | Ms. Bushra Sharif
Chairperson & Associate Professor
Department of Geography
Lahore College for Women University, Lahore | Member |
| 11. | Mr. Muhammad Rafique Dhanani
Chairman & Associate Professor
Department of Geography
University of Sindh, Jamshoro,
Sindh | Member |
| 12. | Mr. Khadim Ali Khan
Assistant Professor & Head
Department of Geography
Government College University,
Lahore | Member |
| 13. | Mr. Asad Ali Khan
Assistant Professor
Department of Geography
Islamia University, Bahawalpur | Member |
| 14. | Dr. Mudassar H. Arsalan
Assistant Professor,
Institute of Geographical Information System
National University of Sciences & Technology,
Tamiz-ud-Din Road, Rawalpindi. | Member |
| 15. | Syed Shahid Ali
Assistant Professor
Department of Geography
University of Karachi, Karachi | Member |

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| 16. | Mr. Muhammad Nawaz
Assistant Professor
GIS Center, Punjab University of Information
Technology (PUCIT)
Punjab University, Lahore. | Member |
| 17. | Mr. Sibqatullah Tahir
Chairman & Assistant Professor
Department of Geography
Government College University, Faisalabad | Member |
| 18. | Mr. Muhammad Nawaz
Assistant Professor
Department of Geography
University of Balochistan, Quetta | Member |
| 19. | Ms. Tasneem Kausar
Assistant Professor
Department of Geography
University of the Punjab, Lahore | Member |
| 20. | Ms. Farha Sattar,
Lecturer
GIS Centre Punjab University of Information
Technology (PUCIT)
Punjab University, Lahore | Member |
| 21. | Ms. Imrana Mushtaq,
Lecturer
Government Postgraduate College for Women
Wahdat Road, Lahore | Member |
| 22. | Mr. Sajjad Hussain Sajjad,
Lecturer
Department of Geography & Earth Sciences
University of Sargodha, Sargodha | Member |
| 23. | Mr. Safdar Ali Shirazi
Assistant Professor
Department of Geography
University of the Punjab, Lahore | Member/Secretary |

Minutes of the meeting

The meeting of the committee held in HEC Regional Center Lahore. The meeting started with the recitation of verses from the Holy Qur`an. by Mr. Bashir Ahmad Deputy Regional Director HEC, Lahore. He also welcomed the participants on behalf of the Chairman HEC and Mr. Riaz Cheema, Director HEC Regional Center, Lahore. In his address he expressed his pleasure over the worthy participation of academia and R&D organizations from all over the country, representing both the public and private sector institutions. He also pointed out the need to prepare the Geography curricula for 4 year BS (Hons) and 2 year MS (Hons) Geography. He emphasized the need of standardized curricula for all HEC recognized Universities/Institutes for quality education and uniformity at the national level. He stated the importance of the programme and emphasized that in order to compete with the international universities it is essential to introduce 4 year BS (Hons) and 2 year MS (Hons). This will facilitate our students to continue higher education abroad and compete for international job market.

Mr. Bashir Ahmad then asked the convener to take over the proceeding of the meeting. Dr. Amir Khan thanks the representatives of HEC present in the meeting and ensured that vigorous effort will be made by the NCRC in Geography collectively to produce final draft of a quality document in Geography with consensus and participation of all the members. The convener of the meeting briefed the house about the importance of new 4 year BS (Hons) and 2 year MS (Hons) Geography to bring the subject at par with the developed world arena as well as in developing countries.

Aims and objectives

In the meeting following objectives were considered:

1. To develop international standard Geography curriculum for 4 year BS (Hons) and 2 year MS (Hons) curriculum so that the uniformly could be adopted by the public and privately sector institutions through out the country.
2. To impart up to date knowledge and practical skills amongst Geography graduates through theory, practical and field exercises.
3. To frame tailor made short and medium term training programs for different stakeholders such as, government officials, resource managers, academics, member of civil society organization, and NGOs, CBOs/CCBs.

4. To introduce practical utility of the ramifications of geographical knowledge and tools like maps, surveying techniques and tools essential for transparency, accountability and rational decision-making.
5. Final curriculum for 4 year (Hons) Bachelor and 2 year MS (Hon) in Geography for the first time at the national level was discussed in length and developed. The current intake of geography students at various levels in the country and the eligibility criteria was discussed in detail. The existing 2-years BA/B.Sc programme and other available four year BS (Hons) Geography courses of various Universities of the country were considered by the house during the discussion. Web sites of different international universities were visited to see the under graduate and graduate programmes in Geography particularly in the technologically advanced countries of the world.

The following schemes of studies were prepared in the meeting accordingly.

Bachelor of Science four year BS in Geography.

1. Eligibility

Intermediate or equivalent not less than 45% marks.

2. Duration

Four years program spread over 8 semesters (two semesters per year).

3. Degree Requirement

Minimum of 130 Credits are required to complete 4 year BS (Hons) in Geography.

4. Evaluation

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

Scheme of Study for 4 Year BS (Hons)

The scheme of study for 4 year BS (Hons) is given in the following table: (The Course No. indicates the year of education e.g., Course Nos 300 series mean the third year of education after matriculation from high or higher secondary school; Course Nos 500 mean the fifth year of education and so on).

Course No	Semester 1	C.Hrs.	C No.	Semester 2	C.Hrs.
Eng 30?	English	3(3+0)	Eng 30?	English	3(3+0)
Geog 301	Physical Geography - I	4(3+1)	Geog 303	Physical Geography- II	4 (3+1)
Math 30?	Mathematics - I	3(3+0)	Math 30?	Mathematics – II	3(3+0)
Geog 302	Introduction to Computing	4(1+3)	Geog 304	Map Work	4(1+3)
30?	Elective -I	3	30?	Elective –I	3
	Total Credit Hours	17		Total Credit Hours	17
	Semester 3	C Hrs.		Semester 4	C Hrs.
Eng 40?	English	3(3+0)	Eng 40?	English (Comm. Skills)	3(3+0)
Math 40?	Mathematics -III	3(3+0)	Math 40?	Mathematics – IV	3(3+0)
Geog 401	Human Geography	4(3+1)	Geog 403	Geography of Pakistan	4 (3+1)
Geog 402	Computer Techniques in Geography	3(2+1)	Geog 404	Surveying	3(1+2)
40?	Pakistan Studies	2(2+0)	40?	Islamic Studies/Ethics	2(2+0)
40?	Elective -I	3	40?	Elective-I	3
	Total Credit Hours	18		Total Credit Hours	18
	Semester 5*	C Hrs.		Semester 6	C Hrs.
Geog 501	History and development of Geographical thought	3(3+0)	Geog 507	Economic Geography	3 (2+1)
Geog 502	Geomorphology	3(2+1)	Geog 508	Population Geography	3 (2+1)
Geog 503	Climatology	3(2+1)	Geog 509	Introduction to GIS	3(2+1)
Geog 504	Oceanography	3(2+1)	Geog 510	Settlement / Rural / Urban Geography	3(2+1)
Geog 505	Quantitative Techniques	3(2+1)	Geog 511	Region & regional concepts	3(2+1)
Geog 506	Cartography	3(1+2)	Geog 512	Introduction to Remote Sensing	3(2+1)
	Total Credit Hours	18		Total Credit Hours	18
	Semester 7**	C Hrs.		Semester 8	C. Hrs.
Geog 600 level courses	Five optional papers each with 3-credit hrs. to be selected in semester 7 from Groups A,B,C,D & E.	3x5 =15	Geog 602	Internship/Group Survey with report and its presentation in a seminar.	6
			Geog	Research Project	6

Geog 601	Research Methodology (including submission of research proposal to be conducted in semester 8)	3(3+0)	603	Report based on field study and its presentation in a seminar.	
	Total Credit Hours	18		Total Credit Hours	12

Note:

*Those candidates who have studied Geography as an elective in Semester 1,2,3 & 4 (or 2 years in conventional/annual system) in any recognized degree college shall be entitled to get admission in semester 5 (junior year) on merit basis.

**Number of options that shall be offered during the course of study will depend upon the availability of faculty and lab facilities. More groups can also be added depending on the availability of resources. Special courses are listed in Group A, B, C, D & E. Candidate are not allowed to select more than one paper from Group D. More special topics could be added to these. More special topics could be added to these. The individual institutions respective Board of Study, keeping in view the availability of staff and resources may prepare the detail out line of the course and approve it accordingly.

DETAILS OF COURS

Geog: 301 Physical Geography - I

Objective

To create an understanding about the physical environment
 To impart knowledge of physical geography with special reference to lithosphere and universe

Course outline

The universe: Solar system and the earth; earth's origin, shape and size, rotation and revolution
 Lithosphere: Introduction to geological time scale
 Distribution of land and water
 Composition and internal structure of the earth
 Rocks – origin, formation and types (igneous, sedimentary and metamorphic)
 Plate tectonics, mountain building, geomorphic processes – internal and external,
 Earthquakes and volcanic activity,
 weathering, mass wasting, cycle of erosion, erosion and deposition,
 landforms produced by surface water, ground water, wind and glaciers.

Lab work outline

Identification of rocks and minerals, Study and identification of landform using air photos and General Topographic Sheet, soil and water analysis. Use and making of various models showing various types of landforms. Drawing of world map showing the origin of continents and oceans.

Field visits

Ground truthing and identification of various types of rock, fluvial, glacial, desert landform, type of soil and landforms of limestone topography.

Visit to the coastal area to observe and appreciate the characteristic of coastal features.

Visit to soil survey of Pakistan, geological survey of Pakistan, and SUPARCO

Visit to and study of a landforms site.

Books recommended

1. Strahler, A.N. (2004) "Modern Physical Geography" New York: John Wiley.
2. Gabler, R.E, Sager, R.J and Wise, D.L (1997) Essentials of Physical Geography, Fourth Edition. Saunders College Publishing, New York. ISBN 0-03-098237-5.
3. Scott, R.C (1996) Introduction to physical geography, West Publishing Co, New york. ISBN: 0-314-06260-2.
4. Miller, G.T (1996) Living in the Environment, Principles, connections and solutions, Ninth Edition, Wadsworth, ISBN0 534 23898 x.
5. Thurman, H.V. & Mexrill (1996) "Essentials of Oceanography" Menson, London.
6. Diwan A.P. & D.K. Arora (1995) "Origin of the Ocean" Anmol Publisher, Delhi.
7. Mcuveen (1992) "Fundamentals of Weather and climate" Prentice Hall New Jersey.
8. Kendrew (1961) Climates of the continents. Longman London/New York.
9. Thornbury, W.D. (1969) "Principles of Geomorphology" John Willy & Sons. New York.
- 10 Strahlar, A.N., Strahlar, A.H. (2004) Physical Environment New York, John Wiley.
- 11 Christopherson, R.W. (2000) Geo-systems, USA, Prentice-Hall, Inc.
- 12 Monkhouse, F.J. (1996) Principles of Physical Geography, London Hodder & Stoughton.
- 13 Rathor, A. Hamid, 1996 Tabhi Geographia, Islamabad Muqtadra Qaumi Zaban
- 14 De Blij, H. J and Muller, P.O. (1996) Physical Geography of the global Environment, USA, John Wiley and Sons Inc.
- 15 Taylor, J. (1993) Integral Physical Geography, London Longman
- 16 Small, R. J. (1989) Geomorphology and Hydrology, London, Longman.
- 17 Thompson, R.D. et. al (1986) Process in Physical Geography, London, Longman.

- 18 Miller, E.W. (1985) *Physical Geography*, Columbus, Charles E. Merrill
19 King, CAM (1980) *Physical Geography*, Oxford, Basil Blackwell.

Geog: 302 Introduction to Computing

Objective

This is a hands-on introductory course for non-computer majors. This course is specifically developed as a preliminary personal/Desktop computer applications course. No previous computer experience is necessary; however, typing skills will be helpful. In this course, students will gain practical hands-on experience in creating business documents using Microsoft Windows & MS Office applications. At the completion of the course students should be able to:

- Understand the basic architecture of the computer
- Demonstrate basic computer skills using Microsoft Office
- Demonstrate fundamental knowledge and skill in Internet Explorer 6 (World Wide Web)

Course outline

Introduction to computers and Windows environment, computer architecture, file manager, Windows accessories, Word processing using Microsoft Word 2003, create and edit documents, format documents, file merging, create resumes, letters, memos, reports, timesheets, faxes, create and edit tables, create documents for use on the internet, spreadsheet techniques using Microsoft Excel 2003, create spreadsheets, budgets, expense reports, add formulas and functions to a spreadsheet, create charts, create marketing and sales reports, create invoices and purchase orders, build basic financial statements and spreadsheets for use on the Internet, link spreadsheets and charts to word documents, presentation techniques using Microsoft PowerPoint 2000, creating presentation, working with different views in PowerPoint, working with slides, linking and embedding objects, adding sound, music, video and voice, animation text and objects, working with database using Microsoft Access 2003, creating and working with databases, tables, datasheets and pivot tables, forms, reports, internet explorer, internet, protocols, web surfing.

Lab outline

Lab 1. Introduction to Microsoft Windows

Lab 2. Windows application

Lab 3. Word Processing with Microsoft Word

Lab 4. Working with Spreadsheets - Microsoft Excel

Lab 5. Creating Slide Presentations - Microsoft PowerPoint

Lab 6. Working with Databases - Microsoft Access

Lab 7. Creating Graphic Animations

Books recommended

1. Favro, Stolins, Caldwell, Mardar, Marotti, & Murphy (2004) Microsoft Office 2003: Essentials Course”, Labyrinth Publications. ISBN: 1-59136-027-7.
2. Carey, Zimmerman, Shaffer, Adamski & Finnegan (2006) New Perspectives on Microsoft Office 2003. Second Edition, Course Technology,

Software

Microsoft Office 2003 Suite, Internet Explorer, and Windows XP will be used.

Geog: 303 Physical Geography- II

Objective

To create an understanding of physical environment with special reference to the atmosphere, hydrosphere and biosphere

Course outline

Atmosphere:

Composition and structure of atmosphere

Atmospheric temperature and pressure, winds and global circulation, air masses and fronts (classification, distribution and associated weather), cyclones and weather disturbances

Hydrological Cycle: Atmospheric moisture and precipitation.

Climatic classification: Köppen’s classification with special reference to the following types: Af, Am, Bsh, Csa and Dfc. Atmospheric pollution.

Hydrosphere:

Configuration of ocean floor, ocean deposits, composition, temperature, and salinity of ocean water, movements of the ocean water; waves, currents and tides

Biosphere:

Origin and evolution of life on Earth (with reference to Geological time scale).

Formation and types of soils

Eco-systems and world major Biomes

Lab outline

Recording and observation of weather data from a mini weather station

Drawing of world map showing the origin of continents and oceans

Field visits

Visit to the coastal area to observe and appreciate the characteristic of coastal features made by sea waves and tide.

Visit to any national park/biosphere reserves; soil survey of Pakistan, geological survey of Pakistan, Meteorological station/observatory and National institute of oceanography and SUPARCO

Observations about the clouds and identification of their types

Books recommended

- 1 Strahlar, A.N., Strahlar, A.H. (2004) Physical Environment, New York, John Wiley.
- 2 Christopherson, R.W. (2000) Geo-systems, USA, Prentice-Hall, Inc.
- 3 Well & Well and N. (1998) Atmosphere and Oceans, London Longman
- 4 Monkhouse, F.J. (1996). Principles of Physical Geography, London Hodder & Stoughton.
- 5 Rathor, A. Hamid, (1996) Tabhi Geographia, Islamabad, Muqtadra Qaumi Zaban
- 6 De Blij, H. J and Muller, P.O. (1996) Physical Geography of the global Environment, USA, John Wiley and Sons Inc.
- 7 Taylor, J. (1993) Integral Physical Geography, London Longman
- 8 Mcliveen, J.F.R. (1991) Fundamentals of Weather and Climate London, Chapman & Hall
- 9 Thompson, R.D. et. al (1986) Process in Physical Geography, London, Longman.
- 10 Miller, E.W. (1985) Physical Geography, Columbus, Charles E. Merrill
- 11 King, CAM (1980) Physical Geography, Oxford, Basil Blackwell.

Geog: 304 Map Work

Objective

To train students in map drawing, reading and its use for geographical analysis. After the successful completion of this course the students are expected to have a good knowledge of map reading and map drawing

Course outline

Principles and methods of map making, reading, reproduction, enlargement and reduction

A study of the ordinance survey maps of Pakistan and other countries under the heads viz;

Scale: types and their use, grid reference and indexation,

Physical and cultural feature (to be described and interpreted)

Map projections: types, construction, characteristics, and uses

Exercises in air photo interpretation

Interpretation of weather maps of Pakistan

Instrumental survey and records

Surveying using the following instruments: Chain Tape, Plane Table and Prismatic Compass

Determination of heights and slopes with Abney Level

Contouring by Indian Clinometer

Use of Dumpy level and Theodolite

Field visits

Visit to Survey of Pakistan, Rawalpindi

(The students are required to record the exercises in practical notebook duly signed by the concerned teachers).

Books recommended

1. Breed, C.B. & G.L. Hosmer (1953) Surveying. John Wiley & Sons.
2. Thomas W.N. (1942) Surveying, John Wiley and Sons.
3. Usili G.W. (1960) Practical Surveying, The Technical Press Ltd.
4. Brinker, R.E. & W.C. Taylor (1962) Elementary Surveying, The International Text Book Company 5.
5. Rubey, H. et .al (1958) Engineering Surveys. The Macmillan Company.6.
6. Maginr, D. J (1991) Geographic Information System. Longman London7.
7. Clendinning, J. (1960) Principles of Surveying. Blackie and Sons, Limited Glasgow,
8. Kanetkar, T.P. & Kulkarni, S.V. (nd): Surveying and Leveling part-I. Union Book Stall Karachi.
9. Dink, P. (1962) Map Work. Dehli10
10. Guljan Mushtaq-Ur-Rehman (1974) Map Projection. Oxford University Press.11
11. Carey, H. Helen (1983) How to Use Maps and Globes. Franklin Watts, London New York.

Geog: 401 Human Geography

Objective

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

Course outline

Meaning, scope and status of Human Geography

Basic concepts and theories including environmental determinism, possibilism, probabilism and cognitive behaviourism

Population: population distribution, density, and growth dynamics including fertility, mortality and migration), population composition; rural and urban population

Natural resources and human activities: primary, secondary and tertiary (agriculture, mining, forestry animal husbandry, and poultry

Light and heavy industries, transport, trade and tourism and their impacts on environment

Settlements and central place theory: types of settlements, urbanization, rural urban contrast

Introduction to urban structure: land use and land cover pattern e.g. commercial, industrial and residential, open, green spaces/belt and transport.

City-size distribution, intermediate and primate city

Rural settlements, dispersed, nucleated and Ribbon settlements

Environmental issues, causes and remedies

Field visits

To identify the use of natural resources, to study land use and land cover, to study the urban structure, national parks, industrial areas and various rural and urban settlements of Pakistan.

Books recommended

1. Rowntree, L. et .al (2004) "Globalization and Diversity: Geography of a Changing World" New York; Prentice Hall.
2. Neuwirth, R. (2004) "Shadow Cities: A Billion Squatters, A New Urban World"; London. Routledge.
3. Harper, H.L. (2003) "Environment and Society: Human Perspectives on Environmental Issues" (3 Edition) New York; Prentice Hall.
4. Knox, P.L. & S.A. Marston (2003) "Places and Regions in Global Context: Human Geography" (3rd Edition) New York; Prentice Hall.
5. Becker, A. & Secker (2002) "Human Geography: Culture, Society, and Space" (7th Edition) New York; John Wiley and Sons.
6. Blij, H.J.D. (2002) "Human Geography: Culture, Society, and Space" (7th Edition) New York; John Wiley and Sons.
7. Lewis, C.P. Mitchel-Fox & C. Dyer (2001) "Village, Hamlet and Field: Changing Medieval Settlements in Central England" London; Windgather Press.
8. Hagget, P. (1997): "Geography: A Modern Synthesis" London. Harper International.

Geog: 402 Computer techniques and Graphics in Geography

Objective

To familiarize student with the use of computer for the drawing of the graphic

Course outline

Introduction to the theory of computer mapping

Development of computer-assisted cartography

Maps as data model; maps and data processing systems

Geographic and Cartographic database Concepts:

Spatial resolution and scale, geographic and cartographic databases,

Spatial database: Handling digital databases, digital data formats,

Data acquisition: Data input systems and data processing,

Statistical surveys: Data classification, data analysis, graphic including mapping and statistical presentation, mapping methods, map design and advanced mapping environment, symbolization, graphic variables, lettering and electronic atlases.

Exercises

- i. Spatial data and Statistical mapping
- ii. Conversion of projections
- iii. Design and production of following maps & diagrams
 - a. Thematic
 - b. Topographic relief
 - c. Climatic
 - d. Economics
 - e. Population
 - f. Settlements
 - g. Block diagrams
 - h. Cartograms
 - i. Economic data graphs

Books recommended

1. Cromley, R.G. (1992) Digital Cartography, Prentice Hall, New Jersey.
2. Demers, M.N. (2000) Fundamentals of Geographic Information Systems, John Wiley & Sons, New York.
3. Garnet, A. (1935) Geographical Interpretation of Topographical Maps, London.
4. Johnson et al. (1992) Geographic Information system and Mapping, American Society for Testing and Materials.
5. Keats, J.S. (1973) Cartographic Design and Production Longman, London.
6. Kraak, M.J. & Ormelling, F.J. (1996) Cartography: Visualization of Spatial Data Longman, Harlow.
7. Lawrence, G.R.P. (1971) Cartographic Methods, Methuen & Co., London.
8. Mather, P.M. (1991) Computer applications in Geography, John Wiley & Sons, New York.
9. Monkhouse F.J. & Wilkinson, H.R. (1973) Maps and Diagrams, London, Methuen.
10. Peterson, M.P. (1995) Interactive and Animated Cartography, Prentice Hall, New Jersey
11. Robinson, A. N. (1994) Elements of Cartography, New York, John Wiley.
12. Taylor, D.R.F. (1991) Geographic Information Systems: The Micro Computer and Modern Cartography, Pergamon Press, Oxford.

Geog: 403 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 settlement, resources and related human activities.

Course outline

Detailed regional study of politico-historic, environmental and administrative setting of Pakistan:

Physiography, climate, hydrology, soil, natural vegetations including flora and fauna
Resources: agriculture, water including irrigation, minerals, industries, human population and settlement

Trade and communication: major cities, tourism and cultural heritage
Special features and regional problems, geo-political importance and problems,
relation with the neighbouring countries

Lab outline

Survey, data collection and presentation on different thematic maps

Field visits

To identify various physical regions and study 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 to be decided by the respective college/university keeping in view the availability of resources.

Books recommended

1. Davidson, A. P & Munir Ahmad (2003) Privatization and the Crisis of Agricultural Extension: The Case of Pakistan (King's Soas Studies in Development Geography). Ashgate Publishing
2. Abdul Hameed (1972) Historical and descriptive geography of water development in West Pakistan: A case study of the Middle Indus Basin. San Francisco State College
3. Dichter, D. (1967) Geography of N-W.F.P. Oxford University Press
4. Jonson B.L.C. (1969) South Asia: selective studies of the essential geography of India, Pakistan and Ceylon. Heinemann Educational
5. Ahmad, K.S. (1964) Geography of Pakistan, Oxford University Press
6. Sahibzada, M.A (1960) Land Use Survey of N-W.F.P. Part-I P & D Department Government of Pakistan
7. Tayyeb, A. (1966) A Political Geography of Pakistan, Oxford University Press
8. Spate, O.H.K., (1984) India and Pakistan, Munshiram Mohoarlal Publications Pvt. Ltd
9. Khan F.K. (1991) Geography of Pakistan. Oxford University Press, Karachi
10. Burkey, J.S.(1991) Pakistan the continuing search for Nationhood. Western Press, Oxford, UK
11. Imperial Gazetteer of India (1901) North West Frontier Province. Government of NWFP Printing Press Peshawar.

Geog: 404 Surveying

Objective

To train students in surveying of small area, map drawing and reading
To make them understand the use of various modern scientific equipments used for surveys.

Course outline

Plane Table, Compass and Chain surveying:

General description, instruments, procedure, methods, advantages and disadvantages, errors, two point and three points problems; bearing, Compass survey, compass traverses (open and close) calculation of included angles – calculated bearings plotting from the true north - adjustment of errors-compass sketch surveys-fixing new station-combined traverses and sketch surveys.

Leveling: general description, kinds of levels, adjustments in levels-contours by Clinometer;

Use of Theodolite; finding out height of inaccessible objects;

GPS surveying

Surveying practical

The fieldwork in surveying shall be based on the above instruments. The students shall be required to carry out simple exercises on surveying, using plane table, chain, prismatic, leveling equipments, use of Theodolite and GPS

Books recommended

1. Bygot, J. (1960) revised Edit: An Introduction to Map Work & Practical Geography, Tutorial Press London.
2. Bygott, J. An Introduction to Map Work & Practical Geography, University Tutorial Press London
3. Debenham, F. Exercises in Cartography, Black Blackie & Sons London.
4. Garnets, A.; 1935 Geographical Interpretation of Topographical Maps, London.
5. Keats, J.S.; 1973 Cartographic Design and Production Longman, London.
6. Kraak, M.J. & Ormelling, F.J.; 1996 Cartography: Visualization of Spatial Data Longman, Harlow.
7. Lawrence, G.R.P.; 1971 Cartographic Methods, Methuen & Co., London.
8. Monkhouse F.J. & Wilkinson, H.R. Maps and Diagrams, Methuen London.
9. Riasz Erwin General Cartography, McGraw Hill New York.
10. Robinson, A. N. Elements of Cartography, John Wiley New York.
11. Steers, J.A. An Introduction to the Study of Map Projections, London, University of Press London
12. Threlfall, H.; 1946 A Text-Book on Surveying and Leveling-Map Charles, Riffin London.
13. Usil, G.W. & Hearn G.; 1947 Practical Surveying, Technical Press London.

Geog: 501 History and development of Geographical thought

Objective

To disseminate the geographical thought developed in the past, concepts in the field of historical geography and development thought

To develop the concept of unity and diversity and the scope of geographical education

Course outline

Nature of Geography: definition and scope

Pre-classical period: ancient geography, geography in the middle ages, Muslim contributions, European contributions.

Modern geography: Humboldt and Ritter, after Humboldt and Ritter, Geography from the middle of the 20th century, Dichotomies-physical and human, systematic and regional.

Established traditions: Earth science, area study, area organization, man-land, system analysis, cartographic.

Man-environment interaction themes: Environmental determinism, Possibilism, Probabilism, Cognitive behaviouralism, Islamic concept of man-environment relationship.

Development of nomothetic traditions: facts, concepts, hypotheses and paradigms, ideographic vs. nomothetic, existentialism in Geography, quantitative revolution.

Philosophical framework: Positivism in geography, Critical theory: Pragmatism, Marxism, Phenomenology, Existentialism, Islamic philosophy and geography, ideology, realism, Environmental causation.

Introduction and use of modern tools, like computers, Remote Sensing, Geographical Information Systems (GIS), Global Positioning System (GPS) and Geomatics in modern geography.

Books recommended

1. Dickinson, R.E. (1969) *The Makers of Modern Geography*. London, Routledge and Kegan Paul
2. Dickinson & Howarth, O.J.R (1933) *The Making of Geography*. Oxford, The Clarendon Press.
3. James, P.E. & James, C.F. (Eds.) (1954) *American Geography. Inventory and Prospects*, Syracuse, Syracuse University Press.
4. James, P.E & Mailim G.J. (1981) *All Possible Worlds*, John Wiley & Sons, New York
5. Hartshorne R. (1939) *The Nature of Geography, A Critical Survey of Current Thought in the light of the Past*. Lancaster Association of American Geographers.
6. Ibid (1959) *Perspective on the Nature of Geography* Chicago Rand McNally.
7. Johnston, R.J. (1983) *Geography and Geographers*, London Edward Arnold.
8. Tim, U. (1992) *The Place of Geography*, London: Longman.

9. Murty, K.L. et al (1992) *Research in Geography*, New Delhi: Ashish Publishing.
10. Kenzer, M.S. (Ed.) (1989) *On Becoming a Professional Geographer* Columbus, Merrill Publishing Co.
11. Mitchel, B. (1989) *Geography and Resources Analysis*, New York: Longman
12. Unwin, D. (1989) *Introductory Spatial Analysis*, New York, Methuen.
13. Greogry, D. & MARTIN, R. et al (1988) *Rethinking Human, Geography Society, Space and the Social Sciences*, London: Macmillan
14. Clayton, K. & JOHNSON, J.H. (Ed.) (1988) *Aspects of Geography*, London: Macmillan.
15. Mayhew, S. (1986) *Geography*, Harmonds Worth: Penguin
16. Majid, Muhammad (1989) *Evaluation of Geographic Thought*, New Delhi

Geog: 502 Geomorphology

Objective

To make students understand and recognize different types of landforms; the formation and modification

To explain the geomorphic processes and the agents responsible for these changes

Course outline

An introduction to the concept of continental drift and plate tectonics

Geological time scale

Factors of landform development and geomorphic processes,

Weathering and mass wasting: their geomorphic significance.

Fluvial geomorphic cycle, valley development; classification of valleys; drainage patterns and texture; landforms by surface runoff

Glaciers and their topographic effects: types and regimes of glaciers, major features resulting from glacial erosion, depositional landforms of glaciers, glacio-lacustrine and glacio-fluviatile features.

Desert landforms: creation and modification of landforms by winds, arid erosion cycle.

Karst topography: karst process and associated landforms.

Coastal geomorphology: erosional and depositional features created by sea waves.

Soil development: factors of soil formation, soil profile, texture and structure.

Lab work

Geomorphological profiles, use of aerial photo and Remote sensing techniques for the interpretation of landforms and geomorphologic features.

Field studies

Recommended geomorphologic study and field trips to any accessible areas to study the following:

- a. Nizampur valley: free faces, alluvial fans, bajada

- b. Potwar plateau: loess deposits, pleistocene chronology, pene-plain
- c. Attock Area: river erosion, and deposition, terraces, flood plains
- d. Cherat Hills: pleistocene sequence of the Peshawar valley
- e. Study of escarpment, major deposits, soil studies, etc
- f. Malakand mountains: basin plain, weathering of granite, soil studies
- g. Nowshera area: limestone topography, flood plain of the Kabul river, Khattak piedmonts, pleistocene deposits
- h. Karakoram highway – from Chilas uphill
- i. Kaghan valley, NWFP
- i. Coastal geomorphology, Gwadar, Karachi & Pasni
- k. Desert landforms of Cholistan, Thar, Thal and Nara deserts
- l. Lake features of Manchur, Keenjhar, Hamun-e-Mashkel and lakes of Soan valley

Books recommended

1. Hugget, R.J. (2002) Fundamentals of Geomorphology. Routledge. (Routledge Fundamentals of Physical Geography)
2. Burbank, D.W. & R.S. Anderson (2001) Tectonic Geomorphology: A Frontier in Earth Science. Blackwell Science.
3. Ritter, D.F., R.C. Kochel & J.R. Miller (2001) Process Geomorphology. McGraw-Hill. (4th edition)
4. Martini, I.P. et al (2001) Glacial Geomorphology and Geology. Prentice Hall.
5. Summerfield, M. (1996) Global Geomorphology. Prentice Hall.6.
6. Leopold, L.B., M.G. Wolman & J.P. Miller (1995) Fluvial Processes in Geomorphology. Dover Publications.
7. Leopold, L.B. (1994) A View of the River. Harvard University Press.8.
8. Spark, B.W. (1986) Geomorphology. Longmans. London /New York.
9. Thornbury, W.D. (1969) Principles of Geomorphology. John Willy & Sons. London
10. King, C.A.M. (1966) Techniques in Geomorphology. Edward London.
11. Wooldridge, S.W. & R.S. Morgan (1959) An Outline of Geomorphology: The Physical Basis of Geography. Longmans. London /New York.
12. Dury, G.H. (1960) The Face of the Earth. Penguin Books. London.
13. Clarke (1958) The Study of Soils. Oxford University Press.
14. Russels, E.J. (1959) The World of Soils. Collins Books London.

Geog: 503 Climatology

Objective

This course is designed for the study of climatic elements, variations in weather and climate both spatially and temporarily. The major climatic regions of the world and human impacts on climatic are also treated as important topic of study.

Course outline

Climatic data, collection, presentation and analysis, Elements and factors of climate

Structure and composition of atmosphere, insulation, temperature

Pressure and winds; Jet streams; air masses and fronts;

Precipitation, storms, cyclones, tornadoes and thunderstorm

Classification of climates; a critical study of the Koppen, Miller and

Thornthwaite classification of major climates; climatic types; their

characteristic features and geographical distribution. Climatic change and

variability: Climatic changes consequent upon the phenomena of El-Nino and

La-Nina. Global Warming: causes, impact and trends. Atmospheric pollution:

causes, impact; including Ozone depletion.

Climatic regions of Pakistan

Lab work

Weather map interpretation and analysis, Observation of weather elements

Visit to Met office and hands on exercises

Books Recommended

1. A.P. Diwan and D.K. Aurora; (1995) Origin of Ocean
2. Barry. R.; (1998) Atmosphere, Weather and Climate (7th ed.) London: Clays St. Davis.
3. Byers, H. R.; (1993) General Meteorology, McGraw Hill New York.
4. Critchfield, H.J.; (1991) General Climatology, Prentice Hall New Delhi.
5. Graedel, T.; (1995) Atmosphere, Climate and Change, Scientific American Library, New York.
6. Johnson H.; (1996) An Introduction to Oceanography.
7. Haurwitz, B & Austin, J. (1944) Climatology, McGraw Hill New York.
8. Kendrew, W.G.; (1959) Climatology, 3rd ed. University Press Oxford.
9. Lamb, H (1992) Climate History and the Modern World Methun & Co. Ltd. London.
10. MacIleveen J.F.; (1991) Fundamentals of Weather and Climate, Chapman & Hall London.
11. Miller A.; (2001) Climatology, Methuen New York.
12. Murry;(2000) The Ocean, McGraw Hill New York.
13. Oliver, J.; (1981) Climatology: Selected Applications: Edward Arnold USA.
14. Petterson, S.; (1951) Introduction to Meteorology, McGraw Hill New York.
15. Sellers, A. & Henderson, A.; (1986) Contemporary Climatology, Longman London.
16. Shamshad, K.M.; (1988) The Meteorology of Pakistan, Royal Book Co. Karachi.
17. Shapley, H.; (1960) Climatic Change, Evidence, Causes & Effects, Harward University Press Cambridge.

18. Strahler, A. N; (1998) Elements of Physical Geography, John Wiley New York.
19. Stringer, E.T.; (1989) Foundation of Climatology, Surjeet Publishers New Delhi.
20. Thompson, R.; (1997) Applied Climatology, Principles and Practice Routledge Canada.
21. Trenberth, K.; (1992) Climate System Modeling, McGraw Hill New York.
22. Trewartha, G.T; (196) An Introduction to Climate, McGraw Hill New York.
23. Whyte, I; (199) Climatic Change and Human Society Arnold Division London

Geog: 504 Oceanography

Objective

To make student understand about the origin of oceans, its changing physical characteristics and geomorphology of the ocean floor, so that the student have up-to-date knowledge about the physical characteristic and the resources available in the ocean.

Course outline

Origin of oceans and seas: major water masses and their distribution.

Configuration of oceans - characteristic features of the ocean basins

Temperature, salinity/density of ocean water: distribution causes and effects

Ocean floor deposits, their characteristics and classification

Ocean circulation: waves, currents and tides, their nature, causes, effects and impact on environment.

Special phenomena: storm surges; tsunamis.

Lab work

Drawing of the geomorphological features of the Oceans, mapping of the ocean currents, tides, and other characteristics.

Field visit

Visit to any coastal area to study the various physical features and characteristics of oceans.

Books recommended

1. Thurman, H.V & A.P. Trujillo (2003): (Introductory Oceanography. Prentice Hall.(10th Edition)
2. Pinet, P.R. (2003): Invitation to Oceanography. Jones and Bartlett Publishers (3rd Edition).
3. Thurman, H.V. (2000): Introductory Oceanography. Prentice Hall (9th Edition)
4. Thurman, H.V & A.P. Trujillo (2001): Essentials of Oceanography. Prentice Hall (7th Edition)

Geog: 505 Quantitative techniques

Objective

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

Use of Statistics in Geography: nature of geographical data and measurement scales.

Summary 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 trends lines for linear and exponential series, scatter diagram, standard error and probability, correlation and regression

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

Books recommended

1. Chapman J. and McGraw J.R. et al (1993) An Introduction to Statistical Problems Solving in Geography Oxford: WCB
2. Saxena, H.C. (1993) An easy approach to statistics New Delhi.
3. Haring, L.L. et al (1992) Introduction to Scientific Geographic Research Oxford: ECB
4. Zia-Ud-Din, M (1990) Elementary Statistics. New Delhi, S. Chand
5. Maguire, D.J. (1989) Computers in Geography London: Longman
6. Matthew, H. & I. Foster (1989) Geographical Data. Sources, Presentation and Analysis Oxford: Oxford University Press.

Geog: 506 Introduction to Cartography

Objective

To enable student to use the cartographic techniques for the making of maps and diagrams

Course outline

Nature and history of Cartography,

Basic geodesy, spherical, ellipsoidal and geoidal earth, geographical coordinates, properties of the graticule, geodetic position determination.

Map projections: merits and demerits of commonly used Map projections (Conformed, Equal Area, Azimutual and Polyconic projections).

Scale, reference and coordinate systems, map scale. Reference systems, coordinate systems and Datum.

Cartographic symbols, symbol types and graphic variables, the symbolization problem, symbolizing graphic features.

Mapping statistical surfaces: Form, dimension and colour, texture, classification and generalization. Lettering native of typography, lettering methods, types and type characteristics, photo lettering and automatic control lettering.

Map reading. 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

Map production, form of map output, construction material, output options, composing separations, proofing.

Lab Work

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

Books recommended

1. Ahmad, Q. S; Simple Map Projections, Lahore Publishers United.
2. Bygot, J. (revised by Money); 1960 An Introduction to Map Work & Practical Geography, Tutorial Press London.
3. Bygott, J. An Introduction to Map Work & Practical Geography, University Tutorial Press, London.
4. Debenham, F. Exercises in Cartography, Black Blackie & Sons London.
5. Garnet, A.; 1935 Geographical Interpretation of Topographical Maps, London.
6. Keats, J.S.; 1973 Cartographic Design and Production Longman, London.
7. Kraak, M.J. & Ormelling, F.J.; 1996 Cartography: Visualization of Spatial Data Longman, Harlow
8. Lawrence, G.R.P.; 1971 Cartographic Methods, Methuen & Co., London.
9. Monkhouse F.J. & Wilkinson, H.R. Maps and Diagrams, Methuen London.
10. Riasz Erwin General Cartography, McGraw Hill New York.
11. Robinson, A. N. Elements of Cartography, John Wiley New York.
12. Steers, J.A. An Introduction to the Study of Map Projections, London, University of Press London
13. Threlfall, H.; 1946 A Text-Book on Surveying and Leveling-Map Charles, Riffin London.
14. Usil, G.W. & Hearn G.; 1947 Practical Surveying, Technical Press London

Geog: 507 Economic Geography

Objective

To create an understanding of the world economic Geography with the help of specific examples from various countries including Pakistan

Course outline

Introduction: definition, scope, approaches to study, branches of Economic geography and relationship with other disciplines.

Economic activities: classification and general distribution.

Production and consumption: producer and consumer, decision making, man against nature, comparative advantage, and perception.

Historical evolution of world economic systems: Medieval feudal economics, industrial revolution, economic benefits from colonialism. Modern world system.

Various types of economies, subsistence, primitive, gathering, hunting, herding, cultivation, Intensive farming, gathering commercial grain farming, Mediterranean agriculture, livestock farming, fishing, dairying, mixed farming and plantation farming.

World population growth and distribution.

Agriculture: conditions of agriculture, the physical constraints on agriculture. Land factor in agriculture, world agricultural systems, problems and policies in agriculture. Types of agriculture and their distribution

The role of selected commodities e.g, wheat, rice, sugarcane, cotton, etc

Forest resources: world distribution, environmental and economic significance problem of deforestation, remedial measure (forestation etc.)

Mineral resources, distribution of important minerals, metalliferous minerals, the non-metalliferous minerals, economic factors in mining.

Power resources, form of power, solid fuels, oil & natural gas, non-exhaustible sources of energy

Manufacturing: types and organization, light and heavy industries, locational factors and locational theories, locational analysis of selected industries, iron and steel, textile (cotton, jute, woolen, synthetic) petro- chemical, world industrial regions.

Trade and services functions, tertiary activities, distribution of services, service industries and Central place theory.

Transport and trade: significance and characteristics of transport system, networks, modes of transport, specialization and international trade, multilateral and bilateral trade, free trade areas and common markets, balance of trade, factors of trade, world pattern of trade.

Books recommended

1. Alexander, J.W., 1963 Economic Geography, Prentice Hall New Jersey.
2. Alexanderson, G. 1947 Geography of Manufacturing, Englewood Cliffs,
3. Alnwick, H. 1981 Geography of Commodities: Harrap London.
4. Atlas of the World's Resources, Agriculture Resources of the world, (latest ed., by Royan W.V. 1954, Prentice Hall New York.
5. Boesch, H. 1964 A Geography of World Economy, Princeton: D. Van Nostrand,
6. Boyce, R. R. 1947 The Basic of Economic Geography, Holt, Rinehart & Winston New York.
7. Carlson A. S, 1956 Economic Geography of Industrial Materials: Reinhold Publishing Corporation New York.
8. Fryer, D.W. 1965 World Economic Development, McGraw Hill New York.

9. Harthorn, T.A and Alexander, J.W. (1998): Economic Geography. Today. New Delhi. TTDD.
10. Hartshorne T.A. & Alexander J.W. (1988) Economic Geography, Prentice Hall, Inc. Englewood Cliffs, New York.
11. Highsmith R.M. 1963, Geography of Commodity Production, Philadelphia, Lippincott.
12. Hodder, B.W. & Bogar Lee 1974, Economic Geography, Methuen London.
13. Hover, E. M., 1948 The Location of Economic Activity, McGraw Hill New York.
14. Jarrett, H.R. 1969, Geography of Manufacturing, MacDonald & Evans Ltd. London.
15. Jones, C.F. & Darken, 1965 Economic Geography, Macmillan New York.
16. Khan F.K (1977). An Introduction to Economic Geography. Sir Syed Academy, Karachi.
17. Khan, F.K. (1998): An introduction to Economic Geography. Saleem Publishing house, Karachi.
18. London, C. E. 1939, Industrial Geography, Prentice Hall New York.
19. Miller & Willard 1962, Geography, of Manufacturing, Englewood Cliffs, Prentice Hall
20. Norman P. (1981) Success in Economic Geography_John Murray (publishers) Ltd.
21. Pounds, N. J.G. 1959, The Geography of Iron and Steel, Hutt Chinson University Library. Prentice Hall, 1967, London.
22. Sadhukhan, S.K. (1986): Economic Geography, An Appraisal of Resources. S. Chand and Company Ltd. New Delhi.
23. Thoman, Conklin & Yeats (1988): The Geography of Economic Activity. McGraw-Hill Book Company, New York, Inc
24. Truman A. Hartshorn & Jhon W.Alexander (1992): Economic Geography. Printice-Hall of India. Pvt.25
25. 1. Peach W.N. & J.A.constantin (1972): Zimmermans World Resources and Industries. Happer and Raw, Publishers, New York.26
26. Smith, J.R., M.O.Phillips & T.S.Smith (1961): Industrial and Commercial Geography. Hott, Rinehart and Winston, New York. 27
27. Miller.E.W. (1962): A Geography of Manufacturing. Prentice Hall International Inc. London.28.
28. U.N.O. Statistical Year Books. Latest Editions.29.
29. Paul Knox & John Agnew (1994): The Geography of the World Economy. Edward Arnold, London. 30.
30. Luckas. M.R. (1991): Economic Activity. Longman group UK Limited. Williams. T.R. (1991): Economic Geography: Longman group, New York Stamp, L.D. & S Carter 31.
31. Gilmour (1960): A Handbook of Commercial Geography. Longman London.32.
32. Howard G. Roepke (1967): Readings in Economic Geography. John Wiley and Sons, New York.33.
33. Rogen W.E. & N.A. Bengtson (1964): Fundamentals of Economic Geography. Prentice Hall.34.

34. Thomes, R.S. & R.J. Hagget (1980): Models in Geography. Harper and Row Publishers London.

Geog: 508 Population Geography

Objective

Objective of the course is to make student understand: i) The Dynamics of population characteristics; ii) Relationship between Man and environment and resources; iii) Highlight the importance of demographic data in planning and decision-making.

Course outline

1. Scope and states of population Geography
2. Problems of population data and its availability
3. World population distribution, density and growth (fertility and mortality) with special reference to Pakistan
4. Urban and rural Population
5. Population Composition: age-structure, sex-composition, marital status, families and households, language, religion, ethnic group, Patterns of Fertility, Patterns of Mortality
6. Migrations: Internal migrations, International migrations

Books recommended

1. Nicholas Polunin (1998): Population and global security, Cambridge University Press
2. Wrebur Zelinsky (1996): A Prologue to Population Geography, Prentice-Hall.
3. Majid Hussain (1994): Population Geography, Anmol Publications
4. William F.Hornby and Meluyn Jones (1980): An Introduction to Population Geography. University Press Cambridge
5. K.M.Lal (1988): Population Settlement Development and Planning Allahbad, India.
6. R.P. Misra (1985): Population Geography. Heritage Publisher
7. Bhaskar D.Minsra (1980): The Study of Population. South Asian Publishers Pvt. Ltd.
8. John.I.Clarke (1972): Population Geography. UK.
9. Waren C. Robbinson (1967): Studies in Demography of Pakistan. Karachi
10. James M. Beshers (1967): Population Processes in Social System. New York.
11. J.Beaudeau-Granier (1966): Geography of Population. Prentice Hall, UK.
12. Glenn.T.Trewartha (1969): A Geography of Population World Pattern. John Wiley & Sons.New York & London.

Geog: 509 Introduction to GIS

Objective

The course aims at providing an understanding of GIS, its evolution, applications, spatial data models and data structures, design aspects of GIS; spatial data acquisition, sources and standards; spatial data manipulation, spatial analysis and visualization of data. This course also covers the understanding of GIS software environment. This subject provides basic training in understanding GIS data capture, storage, retrieval, analysis and display. It also helps to learn functionality of GIS software and to gain basic skills

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

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

Spatial analysis: overlay analysis, neighborhood functions, network, and overlay analysis, buffering, spatial data quality: components of data quality, micro level components, macro level components, usage components sources of error, accuracy, and project work.

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.

Books recommended

1. Aronoff, S. (2004) "Geographic Information Systems: A Management Perspective", WDL Publications, Ottawa, Fifth Edition. ISBN - 0912804008
2. Clarke, K. (2004) "Getting started with Geographic Information System", Prentice Hall , New York, Second Edition. ISBN - 1879102897
3. Heywood, I., Cornelius, S. and Carver, S. (2003) "An introduction to Geographic Information System", Addison Wesley Longman, New York, Second Edition. ISBN - 0130611980
4. Burrough, P.(2002) "Principles of Geographic Information Systems for Land Resources Management", Oxford University Press, Oxford, Second Edition. ISBN - 0198233655
5. McDonald, R. and Burrough, P. (2001) "Principles of Geographic Information Systems", Oxford University Press, Oxford, Second Edition ISBN - 0198233855

6. Foresman, T. (1997) "The history of Geographic Information System", Prentice Hall, New York, ISBN – 0138621454

Geog: 510 Settlement Geography

Objective

- i. To explain the process of the formation and development of human settlements
- ii. To make student understand process of urbanization and morphology of the cities and towns.
- iii. The application of different theories of Settlement and Urban structure to equip the students with knowledge to tackle with contemporary problems of urbanization and human settlement.

Course outline

Scope and status of settlement geography, Basic definition:

urban and non-urban, rural-urban fringe, suburbs, and satellites, site and situation.

Historical evolution of urban settlements, western and non-western urbanization.

Economic base, urban function and functional classification

Internal structure of the cities and land use pattern e.g. commercial, industrial and residential, open and green spaces, public and civic, and transport.

Urban structure theories: Concentric zone theory, Multiple nuclei theory, and Sector theory.

Population: Distribution, characteristics and structure (composition).

City-size, distribution, rank-size rule, primate city

Towns and villages as central places

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.

Survey for town and country planning.

Social area analysis, urban development: slums and blighted areas.

Rural settlements: Dispersed settlements, nucleated and ribbon settlements, contrasts in each between industrialized and developing countries.

Lab work

Analysis of settlements from Topographic sheets, Analysis of settlements as Central places, Analysis of settlements as population foci, Analysis of urban areas, Mapping techniques.

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

Books recommended

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

2. Lewis, C., P. Mitchel-FOX & C. DYER (2001) Village, Hamlet and Field: Changing Medieval Settlements in Central England. Windgather Press.
3. Toh Thian Ser (1998) Maga-cities, Labour, Communications, Institute of South Asian Studies, Singapore Stamford Press, Pvt. Ltd.
4. United Nation Centre Of Human Settlement (1996) An Urbanizing World: Global Report on Human Settlements. Oxford University Press.
5. United Nations Center for Human Settlements (Habitat) (1996) An Urbanizing World: Global Report on Human Settlements. Oxford University Press, Oxford.
6. UNDP (1996) Living in Asian Cities. ST/ESCAP/1660 United Nations, New York.
7. Machail Pocian, 2002 Urban Geography. A global prospective, Rutledge 29 West Word 35th New York NY 10001.
8. Grossman, D. (1992) Rural Process-Pattern Relationships: Nomadization, Sedentarization, and Settlement Fixation. Praeger Publishers
9. Rennie, J. & P. Short (1992) Human Settlement (Illustrated Encyclopedia of World Geography) Oxford University Press.
10. Singh, J. (986) Upper Damodar Valley: A Study in Settlement Geography. Inc/Advent Books Division.
11. Singh, A.K. (1986) Population and Settlement in U P: A Geographical Analysis. Stosius Inc/Advent Books Division
12. Knapp, B. (1986) Systematic Geography. Allen & Unwin, London.
13. Chisholm, M. (1982) Rural Settlements and Land use. Hutchinson University Library, London.
14. Chisholm, M. (1968) Rural settlement and Land use: An Essay in Location. Hutchinson, 2nd (Revised Edition)
15. Murphy, R.E. (1966) The American City: An Urban Geography. McGraw-Hill. New York.
16. Hudson, F.S. (1970) A Geography of Settlement. Macdonald & Evans, London.
17. Mayer. H.M. & Kohn C.F. (1959) Readings in Urban Geography, University of Chicago Press.
18. Gerald Breese (1966): Urbanization in Newly Developing Countries. Prentice-Hall. London.
19. Hagget, P. (1979 latest Edition) Geography and Modern Synthesis. Happer International
20. Robert, Brain K. (1996) Landscapes of Settlements: Prehistory to present London Rutledge

Geog: 511 Region and 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

Scope, status and the significance of the regional approach and concept in Geography

Introduction to regional concepts and methods; criteria for dividing world into regions; types of regions with special emphasis on economic, political, cultural and special purpose regions of the world as suggested by James: their distinguishing characteristics.

Study of each region with an emphasis on South Asia, S.W Asia, Far-eastern regions,

Western Europe, Russia, Central Asia, North Africa and Anglo-America

Systematic study of regions commencing from their physical attributes, location, physiography, climate, soils, hydrology and natural vegetation

Economic attributes, human resources, mineral and power resources etc.

Agriculture, industry, communication and trade

Role/contribution of the region in Global development

Assignment regarding construction of world region maps showing distribution, location of countries, major relief features, resources, trade etc.

Books recommended

1. Deblij, H.J.D. & Muller, Peter O-2003-Geography: Realms, Regions and Concepts, John Wiley and Sons.
2. Knox, P.I.& SA, Marston-2003-Places and Regions in Global Context: Human Geography. Prentice and Hall.
3. Deblij, H.J.D.2005-Concepts and Regions in Geography, John Wiley.
4. James, Preston, E, 1974-One World Divided, John Wiley and Sons.
5. James and Jones, 1965.American Geography; Inventory and Prospects, Association of American Geographers. USA

Geog: 512 Introduction to Remote Sensing

Objectives

To introduce how earth's surface features are recorded from aircraft and satellites and different ways these images can be analyzed.

To enable student for understanding of "common" remote sensing products such as, earth resources satellite images, aerial photographs.

To make them understand about the ground truthing process base on GPS and other topographical maps

Course outline

Definition and history, physical basis (spectrum, energy interaction, spectral reflectance curves, image characteristics)

Introduction to aerial photography, Sensor systems (Space and airborne, MSS, TM, ETM, HRV, LISS, IKONOS-2, Quick bird-2, AVHRR and others),

Platforms (types and orbital characteristics), Thermal infrared (characteristics, TIR Band properties, TIR image interpretation,

Digital image processing (Over view of computer based image processing),

Applications of Remote sensing with special reference to agriculture, urban areas and natural resources.

Lab outline

Introduction to labs, Single band image interpretation, true and false colour predictions, false colour composite images interpretation
Visual interpretation of aerial photographs

Book recommended

1. Lillesand, T. M. and Kiefer, R. W. (2004). Remote Sensing and Image Interpretation, 5th edition. (John Wiley and Sons), ISBN 0-471-15227-7
2. Mather, P M (2004). Computer Processing of Remotely Sensed Images, 3rd Ed. (John Wiley and Sons), ISBN 0-470-84919-3
3. Campbell, James B. (2002). Introduction to Remote Sensing, 3rd Ed., (The Guilford Press) ISBN # 0-7484-0663-8 (pbk).
4. Gibson, P.J (2000). Introductory Remote Sensing: Principles and Concepts (Routledge), ISBN 0-415-19646-9
5. Jensen, J. (2000) Remote Sensing of the Environment: An Earth Resources Perspective, Amazon Publishers, Sabins, F.F (1996). Remote Sensing: Principles and Interpretation, 3rd ed, (W H Freeman & Co), ISBN # 0-7167-2442-1

Semester 7 Cr. 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 than 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.

Groups and list of optional papers**Group 'A' Physical Geography**

Course No	Title	Credit Hours
Geog. 604	Pleistocene Geomorphology	3
Geog. 605	Quaternary Geomorphology	3
Geog. 606	Coastal Morphology	3
Geog. 607	Fluvial Morphology	3
Geog. 608	Glaciology	3
Geog. 609	Geography of Arid Lands	3
Geog. 610	Soil Geography	3
Geog. 611	Meteorology	3
Geog. 612	Hydro-geography	3
Geog. 613	Plant Geography	3
Geog. 614	Zoo-Geography	3
Geog. 615	Climatic Change Studies	3
Geog. 616	Geophysics	3
Geog. 617	Geolithology	3
Geog. 618	Mathematical Geography	3
Geog. 619	Geodesy	3

Group 'B' Human Geography

Geog. 620	Cultural Geography	3
Geog. 621	Social Geography	3
Geog. 622	Population Geography	3
Geog. 623	Transportation Geography	3
Geog. 624	Urban Geography and Planning	3
Geog. 625	Rural Settlement Geography	3
Geog. 626	Agriculture Geography	3
Geog. 627	Urban and rural land use	3
Geog. 628	Political Geography	3
Geog. 629	Behavioural Geography	3
Geog. 630	Geography of Manufacturing	3
Geog. 631	Geography of Marketing	3
Geog. 632	Regional Planning	3

Geog. 633	Geography of Recreation and Tourism	3
Geog. 634	Military Geography	3
Geog. 635	Medical Geography	3
Geog. 636	Industrial Geography	3
Geog. 637	Geography of Migration and Regional Development	3
Geog. 638	Historical Geography	3
Geog. 639	Geography of Health Care	3
Geog. 640	Geography of Housing	3
Geog. 641	Geography of Crimes	3
Geog. 642	Geography of Administration	3
Geog. 643	Geography of Religion	3
Geog. 644	Geography of Nutrition	3

Group 'C' Applied Geography

Geog. 650	Environmental Geography	3
Geog. 651	Quantitative Geography	3
Geog. 652	Gender Geography	3
Geog. 653	Geography of Natural Hazards and Disasters	3
Geog. 654	Applied Geomorphology	3
Geog. 655	Development Planning	3
Geog. 656	Sustainable Development of Natural Resources	3
Geog. 657	Environmental Impact Assessment (EIA)	3
Geog. 658	Applied Cartography	3
Geog. 659	Applied Geography	3
Geog. 660	Social Impact Assessment (SIA)	3
Geog. 661	Mountain Geography	3
Geog. 662	Geography of Retailing	3
Geog. 663	Urban Environmental Planning and Management	3

Group 'D' Regional Geography

Geog. 670	Far East	3
Geog. 671	South and South East Asia	3
Geog. 672	South West Asia	3
Geog. 673	Central Asia	3
Geog. 674	Western Europe	3
Geog. 675	Eastern Europe	3
Geog. 676	North America	3
Geog. 677	Latin America	3
Geog. 678	North Africa	3
Geog. 679	Sub Saharan Africa	3
Geog. 680	Australia	3
Geog. 681	Muslim World	3

Group 'E' Geoinformatics

Geog. 690	Geographical Analysis	3
Geog. 691	Global Positioning System	3
Geog. 692	Digital Image Processing	3
Geog. 693	Spatial Data Visualization	3
Geog. 694	Spatial Modeling	3
Geog. 695	Photogrammetry	3
Geog. 696	Spatial Data Infrastructure	3
Geog. 697	Cyber Geography	3
Geog. 698	Computer Cartography	3
Geog. 699	Advance Cartographic Techniques	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).

Geog: 601 Research Methodology

Objective

To enable students to conduct independent research including literature review/search and collection of data, its analysis, interpretation and presentation.

Introduction to research approaches; basic versus applied research: bibliography and literature review

Course outline

Types of research: historical research, qualitative/descriptive research; research design, research topic, formulation and statement of a problem, research questions, research hypotheses, research objectives, research plan
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.

Data analysis and interpretation pre-analysis considerations, preparing data for analysis: use of the descriptive statistics and quantitative methods.

Research report writing, bibliography and references

Books recommended

1. Ackerman, Edward A. (1958) *Geography as a Fundamental Research Discipline*, University of Chicago Press, Chicago.
2. Croxton, F.E. & Cowden, D.J. (1955) *Applied General Statistics* Isaac Pitman, London.
3. Ebdon, D. (1977) *Statistics in Geography*, Basil Blackwell Oxford.
4. Gay L. R. (1992) *Educational Research: Competencies for Analysis and Application* Fifth edition, Macmillan Publishing Company,

5. Gee, W. (1950) *Social Science Research Method*, Appleton Century Crofts, Inc. New York.
6. Gregory, S. (1973) *Statistical Methods and the Geographers*, Longman London.
7. Hammond, R.E. Mc. Cullagh (1978) *Quantitative Techniques in Geography*, Clarendon Press, Oxford.
8. Hartshorne, R. *Perspective on the Nature of Geography*, John Murray London.
9. Huff, D. (1973) *How to Lie with Statistics*, Hammonds-worth, Penguin.
10. James, P.E. & Jones C.F (1954) *American Geography, Inventory & Prospects*, University Press, Syracuse.
11. James, P.E. *New View Points in Geography*, National Council for the Social Studies Washington.
12. Norcliffe, G.B. (1977) *Inferential Statistics for Geographers* Hutchins London.
13. Plate, R.S. (1959) *Field Study in American Geography*, Illinois, University Press Chicago.
14. Taylor, P.J. (1977) *Quantitative Methods in Geography*, Houghton Mifflin Boston.
15. Walker (1963) *The Nature of Scientific Thought*, Prentice Hall New Jersey.
16. Wright (1951) *Aids to Geographical Research*, Columbia University Press New York.
17. Young, P.V. (1956) *Scientific Social Surveys & Researches*, Prentice Hall New York.
18. Lyne, Tucker et al. (1990) *Research Methods and Statistical Analysis*. IPS Nottingham University UK.
19. Howard, K. & Sharp, J.A. (1983) *The Management of a Student Research Project*. Gower Publishing Company, UK.
20. Keelinger, Fred N. (1986) *Foundation of Behavioral Research*. New York, CAB Publications
21. Bannet, N. (1973) *Research Design*. Milton Keynes, the Open University, UK

Semester 8 (Crdt. Hrs. 12)

Geog: 602 Internship

Objective

To expose student to do practical work in a real world situation to bridge the gap between theory and write a report on it independently. Learn communication skill by presenting it in a seminar.

Internship project outline

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

Geog: 603 Research Project

Objective

To enable student to carry out independent research project including data collection, data processing and presentation in a report. Learn communication skill by presenting it in a seminar.

Research project outline

Research Project Report on any geographical or related topic based on field/lab study and its presentation in a seminar)

Part- II: Scheme of study for MS (Hons) programme

Two year Master of Science (MS Hons) in Geography

Eligibility

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

OR

ii. Those candidate having 4 years BS in any of the subject such as, Geographical Information System (GIS) & Remote Sensing, Geology, Soil Sciences, Forestry, Hydrology, Geophysics, Meteorology, Environmental sciences, Space Science, Social Sciences, Civil Engineering, Town/Urban & Regional Planning, Computer Science, Statistics, Mathematics shall have to enroll 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. Hons Geography have to attend the core geography courses from semester 5 and 6 or any other courses suggested by the Department of the university.

Duration and Course structure

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

Degree Requirement

- 30 credit hours including thesis

Course Structure	Number of courses	Credit Hours
Core courses (first semester)	4	12
Elective/specialized (Second semester)	4	12
Thesis (third & fourth semesters)	One thesis	One thesis06
Total	9	30

Evaluation

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

Courses structure and Semesters

First semester

Serial No.	Core Courses	Credit Hours
Geog 700	Physical Geography	3
Geog 701	Human Geography	3
Geog 702	Advance Techniques and Tools	3
Geog 703	Advanced Research Methods	3
Total		12

Second semester

Elective/Specialized Courses	Credit Hours
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 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 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 out line of the course and approve it accordingly (for some of the paper the course outline is prepared and given).	4x3 =12

Third and fourth semester

Course	Credit Hours
M. Sc Thesis consisting of 15,000 plus words in semester 3 and 4 including its presentation in a workshop/seminar	6

DETAILS OF COURSES

Geog: 700 Physical Geography

Objectives

Evolves critical thinking amongst the post-graduate students on the significant current issues related to physical geographical phenomena on earth.

Course outline

Natural Hazards; Earthquakes, volcanism, cyclones, floods and their management, tsunami and their impacts
Jet streams and their effects on planetary circulation

Impacts of natural reservoirs on eco-systems, Bio-diversification and ecological equilibrium Desertification, reasons and impacts, droughts, reasons, impacts and mitigation
Degradation of soils and ground water
Watershed management; high latitude and high altitude problems;
Geomorphic parameters in planning and decision-making
Environmental pollution; water scarcity issues; global climate change; major scenarios of climate change; global warming issue; Ozone depletion issue; reasons of changing climate; share of different continents in global warming; environmental impacts of global warming in the world.

Books Recommended

1. Cox, C. Barry, & Moore, D. Peter. (1993) Biogeography, Blackwell Science Ltd.
2. Nagarajan, R. (2003) Drought. Capital Publishing Company.
3. Lal, R., Kimble, J. M., & Stewart, B. A. (2000) Global Climate Change and Tropical Ecosystem. CRC Press LLC.
4. White, Gilbert F. (1974) Natural Hazards. Oxford University Press.
5. Trivedi, P. R. (2004) Environmental Pollution and Control. APH Publishing Corporation, New Delhi.
6. Homar, Arvind. (2002) Environmental Pollution and Agriculture. APH Publishing Corporation, New Delhi.
7. Marsh, William M. & Grossa, John, Jr. (2005) Environmental Geography, John Wiley & Sons.
8. Khan, M. A. & Grwal, S. K. (2004) Environmental Geography, APH Publishing Corporation, New Delhi.
9. Mathus, H. S. (2003) Essentials of Biogeography. Pointer Publishers, India

Geog: 701 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

Scope, status, significance, content, history and development of Human Geography;

Concepts and Philosophies in Human Geography: determinism, possibilism, probabilism and cognitive behavior. Inductive, deductive and system approach, man environment relationship.

Environmental perception and degradation: major world problems and remedial measures.

Impact of population growth trends and distribution characteristics on the economic, cultural, social, political, environmental and occupancy patterns

An appraisal of the processes of sequent occupancy leading to urban sprawl and the development of conurbations

A comparative study of the spatial patterns of world economic regions and their impact on global standards of living
Geopolitical regions, their importance and impact on quality of life
World cultural patterns, modification processes, components and diffusion
World spatial patterns of races, religions and languages
Welfare approach in Human Geography

Books recommended

1. Marsh, W. M. & Grossa, J. (2005) Environmental Geography, Science, Land Use and Earth System, John Wiley and Sons, Hopkin.
2. Rowntree, L. et al (2004) Globalization and Diversity, Geography of a Changing World: A Modern Synthesis, Harper International, London, Prentice Hall, New York.
3. Neuwirth, R. (2004) Shadow Cities: A Billion Squatters. A New Urban World, Routledge, London.
4. Harper, H. L. (2003) Environment and Society: Human Perspectives on Environmental Issues, Third Edition, Prentice Hall New York..
5. Chuck.F.M. & Glassner (2003) Political Geography, Third Edition, John Wiley, New York.
6. Fellman, J. & Getis A.et al (2003) Human Geography, Landscape of Human Activities, Oxford.
7. Knox, P. L. & S. A Marston (2003) Places and Regions in Global Context: Human Geography, Third Edition, Prentice Hall New York.
8. Knew, J. A & Agnew (2002) Making Political Geography
9. James M. Rubenstein (2002) An Introduction to Human Geography, The Cultural Land Scape, Prentice Hall.
10. Becker, A. & Secker (2002) Human Geography: Culture, Society, and Space, Seventh Edition, John Wiley and Sons.
11. DeBlij, H. J. (2002) Human Geography: Culture, Society, and Space, 7th Edition John Wiley and Sons.
12. Lewis, C. P. Mitchell Fox & Dyer, C (2001) Village, Hamlet and Field: Changing Medieval Settlements in Central England, Windganter Press.
13. Kevin R. Cox (2000) Political Geography, Territory, State and Society, Black Well Publisher.
14. Nicholas Polunin (1998) Population and Global Security. Cambridge University Press.
15. Hussain, Majid (1994) Population Geography, Anmol Publication.
16. Truman. Harstorn & Alexander, John W. (1992) Economic Geography, Prentice Hall of India.
17. Thoman, Conklin & Yeat (1988) The Geography of Economic Activity, McGraw Hill Book Company, New York.
18. Knapp, B (1986) "Systematic Geography, Stous Inc /Advnt Book Division.
19. Deblij H.J & Murphy Alexander. B (2002) Human Geography: Culture, Society and Space 7thEdit. John Wiley
20. James, P.B and Jones, F.C (1964) American Geography: Inventory and Prospects, Syracuse University Press.

Geog: 702 Advance Techniques and Tools

Objectives

Course deals with important concepts of spatial data modelling and analysis used in advance cartography.

Displaying and visualisation techniques using geomatic tools e.g., Arc GIS, ERDAS Imagine, CIET Map, Map Info, ER mapper or any other available software

At the completion of the course students should be able to:

- Understand the conceptual framework of spatial and attribute data models
- Demonstrate the skills using Arc GIS and ERDAS imagine/ER mapper/ CIET Map GIS
- Perform complex analysis and retrieve the information from data base
- Identify and classify the objects from satellite images eg, Google earth.

Course Outline

Use of Arc GIS, ERDAS Imagine, CIET Map, Map Info, ER mapper or any other available software Exploring Arc Catalog and Arc Map:

Viewing and Connecting to data, import and export of data .

Digital Cartography: Working and exploring maps, adding layer and features from database, changing how features are drawn, adding labels to a map, working with the map layout/legend, saving and printing map. Thematic mapping of statistical data over space and time, basic training in construction of thematic layers

Assembling the database: Organizing the project database.

Adding data to the project folder previewing the data

Examining the data and cleaning it

Preparing data for analysis: data preparation tasks

Defining coordinate systems: the coordinate system for the elevation data

Preparing geo-database and digitising,

Merging the parcel layers. Navigate around the IMAGINE essentials and IMAGINE advantage interfaces. Import digital data into the IMAGINE environment. Use the IMAGINE Viewer to display imagery, vector files and other data sets.

Create, edit and integrate ESRI Shape files

Create image libraries and catalogs: Assign geographical coordinates to an image to create geometrically corrected and orthorectified imagery.

Mosaic several images to produce one seamless output.

Perform a basic land cover classification using a multispectral image.

Improve a classification using the ERDAS IMAGINE Knowledge Classifier

Use CIET Map for the database and mapping and change detection

Software

Arc GIS and ERDAS Imagine 8.6 Info; II; ARC GIS Desktop Help
CIET Map GIS latest version soft ware developed by CIET International, can be down loaded from www/ciet.org free of cost.

Books Recommended

1. Aronoff, S. (2004) "Geographic Information Systems: A Management Perspective", WDL Publications, Ottawa, Fifth edition. ISBN: 0921804008
2. Kraak, M.J & Ormeling, F. (2004) " Cartography: Visualization of Spatial Data". Addison Wesley Longman. Second Edition. ISBN: 0-13-0888980-7
3. Chang, Krang-tsung, (2002) "Introduction to Geographic Information Systems"McGraw Hill. ISBN: 0-07-049552-1
4. Ed Madej (2001) "Cartographic Design Using Arc View GIS", One Word Press, USA. ISBN: 1566901871
5. ITC (2000) "Principles of Geographic Information Systems" ITC Educational Textbook Series, Enschede, The Netherlands_ ISBN: _90-6461-226-4

Geog: 703 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 quantitative spatial data

To use database and mapping software

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,

Ethical issues,

formulation and statement of research problem, conceptual framework, research questions, research hypotheses, research objectives, and research plan

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 systemic 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, 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

Books recommended

1. Ackerman, Edward A. (1958) *Geography as a Fundamental Research Discipline*, University of Chicago Press, Chicago.
2. Croxton, F.E. & Cowden, D.J. (1955) *Applied General Statistics* Isaac Pitman, London.
3. Ebdon, D. (1977) *Statistics in Geography*, Basil Blackwell Oxford.
4. Gay L. R. (1992) *Educational Research: Competencies for Analysis and Application* Fifth edition, Macmillan Publishing Company,
5. Gee, W. (1950) *Social Science Research Method*, Appleton Century Crofts, Inc. New York.
6. Gregory, S. (1973) *Statistical Methods and the Geographers*, Longman London.
7. Hammond, R.E. Mc. Cullagh (1978) *Quantitative Techniques in Geography*, Clarendon Press, Oxford.
8. Hartshorne, R. *Perspective on the Nature of Geography*, John Murray London.
9. Huff, D. (1973) *How to Lie with Statistics*, Hammonds-worth, Penguin.
10. James, P.E. & Jones C.F (1954) *American Geography, Inventory & Prospects*, University Press, Syracuse.
11. James, P.E. *New View Points in Geography*, National Council for the Social Studies Washington.
12. Norcliffe, G.B. (1977) *Inferential Statistics for Geographers* Hutchins London.
13. Plate, R.S. (1959) *Field Study in American Geography*, Illinois, University Press Chicago.
14. Taylor, P.J. (1977) *Quantitative Methods in Geography*, Houghton Mifflin Boston.
15. Walker (1963) *The Nature of Scientific Thought*, Prentice Hall New Jersey.
16. Wright (1951) *Aids to Geographical Research*, Columbia University Press NewYork.
17. Young, P.V. (1956) *Scientific Social Surveys & Researches*, Prentice Hall New York.
18. Lyne, Tucker et al. (1990) *Research Methods and Statistical Analysis*. IPS Nottinghamm University UK.

19. Howard, K. & Sharp, J.A. (1983) *The Management of a Student Research Project*. Gower Publishing Company, UK.
20. Keelinger, Fred N. (1986) *Foundation of Behavioral Research*. New York, CAB Publications
21. Bannet, N. (1973) *Research Design*. Milton Keynes, the Open University, UK
22. Chapman J. and Mcgraw J.R. et al (1993) *An Introduction to Statistical Problems Solving in Geography* Oxford: WCB
23. Saxena, H.C. (1993) *An easy approach to statistics* New Delhi.
24. Haring, L.L. et al (1992) *Introduction to Scientific Geographic Research* Oxford: ECB
25. Zia-Ud-Din, M (1990) *Elementary Statistics*. New Delhi, S. Chand
24. Maguire, D.J. (1989) *Computers in Geography* London: Longman
- Matthew, H. & I. Foster (1989) *Geographical Data. Sources, Presentation and Analysis* Oxford: Oxford University Press.

Semester 2 Cr. Hrs. 3x4=12 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 out line of the course and approve it accordingly (for some of the paper the course outline is prepared and given).

Groups and list of optional papers

Group 'A'		Physical Geography	
Course No	Title	Credit Hours	
Geog. 804	Pleistocene Geomorphology	3	
Geog. 805	Quaternary Geomorphology	3	
Geog. 806	Coastal Morphology	3	
Geog. 807	Fluvial Morphology	3	
Geog. 808	Glaciology	3	
Geog. 809	Geography of Arid Lands	3	
Geog. 810	Soil Geography	3	
Geog. 811	Meteorology	3	
Geog. 812	Hydro-geography	3	
Geog. 813	Advance Plant Geography	3	
Geog. 814	Zoo-Geography	3	
Geog. 815	Climatic Change Studies	3	
Geog. 816	Geophysics	3	
Geog. 817	Geolithology	3	
Geog. 818	Mathematical Geography	3	
Geog. 819	Geodesy /and Advance surveying	3	
Group 'B'		Human Geography	
Geog. 820	Cultural Geography	3	
Geog. 821	Social Geography	3	
Geog. 822	Population Geography	3	
Geog. 823	Transportation Geography	3	
Geog. 824	Urban Geography and Planning	3	
Geog. 825	Rural Settlement Geography	3	
Geog. 826	Agriculture Geography	3	
Geog. 827	Urban and rural land use	3	
Geog. 828	Political Geography	3	
Geog. 829	Behavioural Geography	3	
Geog. 830	Geography of Manufacturing	3	
Geog. 831	Geography of Marketing	3	
Geog. 832	Regional Planning	3	
Geog. 833	Geography of Recreation and Tourism	3	
Geog. 834	Military Geography	3	
Geog. 835	Medical Geography	3	
Geog. 836	Industrial Geography	3	
Geog. 837	Geography of Migration and Regional Development	3	
Geog. 838	Historical Geography	3	
Geog. 839	Geography of Health Care	3	
Geog. 840	Geography of Housing	3	
Geog. 841	Geography of Crimes	3	
Geog. 842	Geography of Administration	3	
Geog. 843	Geography of Religion	3	
Geog. 844	Geography of Nutrition	3	

<u>Group 'C'</u>	<u>Applied Geography</u>	
Geog. 850	Environmental Geography	3
Geog. 851	Quantitative Geography	3
Geog. 852	Gender Geography	3
Geog. 853	Geography of Natural Hazards and Disasters	3
Geog. 854	Applied Geomorphology	3
Geog. 855	Development Planning	3
Geog. 856	Sustainable Development of Natural Resources	3
Geog. 857	Environmental Impact Assessment (EIA)	3
Geog. 858	Applied Cartography	3
Geog. 859	Advance Applied Geography	3
Geog. 860	Social Impact Assessment (SIA)	3
Geog. 861	Mountain Geography	3
Geog. 862	Geography of Retailing	3
Geog. 863	Urban Environmental Planning and Management	3

<u>Group 'D'</u>	<u>Regional Geography</u>	
Geog. 870	Far East	3
Geog. 871	South and South East Asia	3
Geog. 872	South West Asia	3
Geog. 873	Central Asia	3
Geog. 874	Western Europe	3
Geog. 875	Eastern Europe	3
Geog. 876	North America	3
Geog. 877	Latin America	3
Geog. 878	North Africa	3
Geog. 879	Sub Saharan Africa	3
Geog. 880	Australia	3
Geog. 881	Muslim World	3

<u>Group'E'</u>	<u>Geoinformatics</u>	
Geog. 890	Geographical Analysis	3
Geog. 891	Global Positioning System	3
Geog. 892	Digital Image Processing	3
Geog. 893	Spatial Data Visualization	3
Geog. 894	Spatial Modeling	3
Geog. 895	Photogrammetry	3
Geog. 896	Spatial Data Infrastructure	3
Geog. 897	Cyber Geography	3
Geog. 898	Computer Cartography	3
Geog. 899	Cartographic Techniques	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 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 geography curriculum at the national level.
2. The broad spectral domain of geography provides an opportunity for a wide range of useful multi – disciplinary associations with other subject areas. Therefore, HEC is to advise the institutions to provide maximum range of combinations both with BS science and humanities group.
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 institution where geography is taught.
5. Refresher courses should be arranged at regular intervals for colleges 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 including GPS
 - 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 to the institutions.
7. Sufficient funds should be allocated by the Institutions for the purchase of teaching aids, surveying and computing equipment/instruments, GPS and other field surveys equipments.
8. Geography must be treated at par with other basic sciences by the HEC.
9. Facility of publication and distribution of monographs and books in geography be made available by HEC.
10. The HEC may advise subordinate institutions to run short-term courses during summer vacation within the ramifications of geography enabling geography teachers to enhance their knowledge.

11. Recognition of Geography as a science subject by the HEC and other National bodies.
12. Development of well-equipped seminar libraries and provision of funds for appropriate collection of journals, literature and reference material including government publications.
13. Organizing refresher courses regularly for postgraduate teachers in collaboration with Survey of Pakistan and SUPARCO to cover the practical portions related with Instrumental Surveying, GIS and Remote Sensing.