



Malad Kandivli Education Society's  
**NAGINDAS KHANDWALA COLLEGE**  
 OF COMMERCE, ARTS & MANAGEMENT STUDIES  
 AND SHANTABEN NAGINDAS KHANDWALA COLLEGE OF SCIENCE

(Re-accredited (3<sup>rd</sup> cycle) by NAAC with 'A' Grade)  
 ISO 9001 : 2015 Certified

Autonomous (2016-17)

Educational Excellence Award By Indus Foundation, U.S.A.  
 IMC Ramkrishna Bajaj National Quality Commendation Certificate

Providing Syllabus copy of the courses highlighting the focus on employability/  
 entrepreneurship/ skill development along with their course outcomes.

Sr. No.	Courses	2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Bachelor of Commerce (B.COM)	✓	✓	✓	✓	✓	5
2	Bachelor of Arts (B.A)	✓	✓	✓	✓	✓	5
3	Bachelor in Management Studies- (BMS)	✓	✓	✓	✓	✓	5
4	Bachelor of Commerce (Accounts and Finance)- BAF	✓	✓	✓	✓	✓	5
5	Bachelor of Commerce (Banking and Insurance)-BBI	✓	✓	✓	✓	✓	5
6	Bachelor of Commerce (Financial Markets)- BFM	✓	✓	✓	✓	✓	5
7	Bachelor of Science - Information Technology (B.Sc IT)	✓	✓	✓	✓	✓	5
8	Bachelor of Science- Computer Science(B.Sc CS)	✓	✓	✓	✓	✓	5
9	Bachelor of Arts- Multimedia and Mass Communication (B.A.MMC)	✓	✓	✓	✓	✓	5
10	Bachelor of Management Studies- Sports Management (BMS-SM)	X	X	✓	✓	✓	3
11	B. Com. Honours in Actuarial Studies	X	X	X	✓	✓	2
12	B.A. Honours in Apparel Design and Construction	X	X	X	✓	✓	2
13	B. Com. Honours in International Accounting	X	X	X	✓	✓	2
14	Bachelor of Management Studies- E commerce operations	X	X	X	X	✓	1
15	B.Sc. (Honours) in Integrative Nutrition & Dietetics	X	X	X	X	✓	1
16	BBA in Tourism and Travel Management	X	X	X	X	✓	1
17	B.Sc. in Interior Design	X	X	X	X	✓	1
18	Master Of Commerce-(M.COM)- Accountancy	✓	✓	✓	✓	✓	5
19	Master Of Commerce-(M.COM)- Management	✓	✓	✓	✓	✓	5
20	Master of Arts (Economics)	✓	✓	✓	✓	✓	5
21	Master of Arts (Geography)	✓	✓	✓	✓	✓	5
22	Master of Arts (Psychology)	X	X	X	✓	✓	2
23	Master of Science (Information Technology) (M.Sc IT)	✓	✓	✓	✓	✓	5
24	Master's Degree - Sports Management (MSM)	X	X	✓	✓	✓	3
25	Master of Science (Geo-informatics) (M.Sc GeoInformatics)	X	X	X	X	✓	1
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*Matta*

Prof. (Dr.) Moushumi Datta  
 I/c. Principal

# UNIVERSITY OF MUMBAI



**Revised Syllabus for the M.A. & M.Sc. Program:  
M.A. & M.Sc.  
Course: Geography  
(Semester I & II)**

(As per Choice based Credit System with effect from  
the academic year 2016–2017)

**Choice Based Credit System Syllabus, 2016-17**

- Total No. of Credits offered: 96
- Electives offered in a particular academic year in each group could vary.
- Semester is 15 weeks duration. Credits are defined for a semester

**Semester I: Core Courses from Parent Department (Four Courses)**

Subject Code (326)	Course Title	Credits	No. of Hours
101	Principles of Geomorphology	4+2*= 6	60+60+ 120
102	Principles of Climatology	4+2*= 6	60+60+ 120
103	Perspectives in Human Geography	4+2*= 6	60+60+ 120
104	Spatial Organisation of Economic Activities	4+2*= 6	60+60+ 120

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105	<b>*Practical components based on 101 and 102</b> Tools and Techniques of Spatial Analysis - I	*	60+60+ 120
106	<b>*Practical components based on 103 and 104</b> Tools and Techniques of Spatial Analysis- II	*	60+60+ 120
Total		24	720

**Semester II: Core Courses from Parent Department (Four Courses)**

Subject Code	Course Title	Credits	No. of Hours
201	Oceanography and Hydrology	4+2*= 6	60+60+ 120
202	Geoinformatics	4+2*= 6	60+60+ 120
203	Socio-cultural and Political Geography	4+2*= 6	60+60+ 120
204	Urban Geography	4+2*= 6	60+60+ 120
205	<b>*Practical components based on 201 and 202</b> Tools and Techniques of Spatial Analysis - III	*	60+60+ 120
206	<b>*Practical components based on 203 and 204</b> Tools and Techniques of Spatial Analysis- IV	*	60+60+ 120
Total		24	720

**Note:** Theory papers and practical components for core and elective papers will be examined by external and internal examiners.

**Semester I**

  
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## 101: Principles of Geomorphology

No. of Credits: 4 Teaching Hours 60 + Notional Hours 60= Total hours 120 Course Objectives:

1. To recognize the various landforms on the Earth
2. To explain the reasons behind the present shape of the planet
3. To apply the theory of landscape development to the present topographical conditions
4. To distinguish between the landform and processes responsible behind them
5. To develop an understanding about the geomorphological processes acting upon the earth and its impacts on mankind
6. To compare between theories of development and draw conclusions

### Course Outcome:

1. **CO1:** Learners will be able to recognize the various landforms on the Earth (Level : Knowledge)
2. **CO 2:** Learners will be able to explain the reasons behind the present shape of the planet (Level: Comprehension)
3. **CO 3:** Learners will be able to apply the theory of landscape development to the present topographical conditions (Level: Application)
4. **CO 4:** Learners will be able to distinguish between the landform and processes responsible behind them (Level : Analysis)
5. **CO 5:** Learners will be able to develop an understanding about the geomorphological processes acting upon the earth and its impacts on mankind (Level : Synthesis)
6. **CO 6:** Learners will be able to compare between theories of development and draw conclusions (Level : Evaluation)

### Detailed Syllabus

1. **Unit - I** (15 hours)
  - 1.1 Nature, scope and content of Geomorphology
  - 1.2 Geological Evolution of Earth and Geological time scale (Employability)
  - 1.3 Development of geomorphic thought, Catastrophism, Uniformitarianism, Neocatastrophism
2. **Unit - II** (15 hours)
  - 2.1 Earth's interior: Structure and composition.
  - 2.2 Continental Drift Theory - Sea floor spreading - Plate Tectonics
  - 2.3 Geosynclines: Geosynclinal Theory of Kober, Holmes' Convection Current Theory Theories of Isostasy
  - 2.4 Endogenetic movements- types, consequences (earthquakes and volcanoes) and landforms
3. **Unit - III (Skill Development)** (15 hours)

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- 3.1 Fluvial Geomorphic system: processes and resulting landforms
- 3.2 Glacial Geomorphic system: geomorphic processes and features
- 3.3 Karst landscape: development and processes
- 3.4 Aeolian Geomorphic system: processes and landforms
- 3.5 Coastal Geomorphic system: processes and landforms

**4. Unit – IV (Skill Development) (15 hours)**

- 4.1 Landscape evolution – Davisian Model of Cycle of Erosion, Penck's Concept of Cycle of Erosion
- 4.2 Slope development and related theories

**References:**

1. Anhert, F., (1996), 'Introduction to Geomorphology', Arnold, London, Sydney, Aukland
2. Bloom, A. L. (2002), 'Geomorphology: A Systematic Analysis of Late Cenozoic Landforms', Pearson Education Pvt. Ltd., and Singapore.
3. Christopherson, R.W. (1994), 'Geosystems : An Introduction to Physical Geography', Macmillan College publishing Company, New York.
4. Dayal, P. (1990), 'A Textbook of Geomorphology', Shukla Book Depot, Patna.
5. Engeln, O. D. Von (1944), 'Geomorphology', The Macmillan Company, New York.
6. Fairbridge R. W. (1968) (ed.), 'Encyclopaedia of Geomorphology', Reinhold, New York.
7. Mitchell, C. E. (1973), 'Terrain Evaluation', Longmans, London.
8. Ritter, D.F., Kochel, R.C., Miller, J.R. (1995), ' Process Geomorphology', Wim. C. Brown Publishers, Chicago.
9. Sparks, B.W. (1988), 'An Introduction to Geomorphology', Longman, London.
10. Strahler A. (1996), 'Physical Geography: Science and System of the Human Environment', John Willey, New York.
11. Thornberry, W.D. (1998), 'Principles of Geomorphology', New Age International Press, New Delhi.
12. Steers, J.A. (2000), 'The Unstable Earth: some recent views in geomorphology', Methuen and co., London.



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## Semester I

### 102: Principles of Climatology

No. of Credits: 4 Contact Hours 60 + Notional Hours 60= Total hours 120 Course

#### Objectives:

1. To memorize the basic concepts in climatology
2. To classify the regions based on the spatial distribution of temperature
3. To apply their understanding on the distribution of atmospheric pressure and types of winds
4. To associate the origin of monsoon with climatic variations
5. To compare the concepts of air masses, fronts and cyclones
6. To assess the classification of climate by Thorntwaite and Koppen in depth

#### Course Outcome:

1. **CO 1:** Learners will be able to memorize the basic concepts in climatology in depth (Level : Knowledge)
2. **CO 2:** Learners will be able to classify the regions-based differences in temperature (Level : Comprehension)
3. **CO 3:** Learners will be able to apply their understanding on the distribution of atmospheric pressure and types of winds all over the globe (Level : Application)
4. **CO 4:** Learners will be able to associate the origin of monsoon with climatic variations and its impacts on mankind (Level : Analysis)
5. **CO 5:** Learners will be able to compare the concepts of air masses, fronts and cyclones and their prediction (Level : Synthesis)
6. **CO 6:** Learners will be able to assess the classification of climate by Thorntwaite and Koppen in depth for better understanding of global climate (Level : Comprehension)

#### Detailed Syllabus

##### 1. Unit – I

(15 hours)

- 1.1 Nature and scope of Climatology
- 1.2 Relationship of Climatology with Meteorology
- 1.3 Structure and composition of Atmosphere
- 1.4 Weather elements and climatic controls

##### 2. Unit – II (Skill Development)

(15 hours)

- 2.1 Insolation and heat Budget of the Earth
- 2.2 Temperature - Vertical, horizontal and seasonal variations
- 2.3 Processes of heat energy transfer
- 2.4 Inversion of temperature

##### 3. Unit – III (Skill Development)

(15 hours)

- 3.1 Atmospheric pressure – vertical and horizontal distribution



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3.2 General Circulation of atmosphere

3.3 Types of winds – Geostrophic, Gradient and local winds

3.4 Modern views about Extra terrestrial wind system, Tricellular meridional circulation, Jet stream

3.5 Origin of Monsoon: Classical and Recent views

**4. Unit – IV (Skill Development) (15 hours)**

4.1 Air masses: Origin, classification, types

4.2 Fronts: frontogenesis and frontolysis – classification of fronts

4.3 Tropical and Extra-tropical cyclones: formation and impact

4.4 Climatic Classification: Koppen and Thornthwaite, concept of water balance  
Problems and prospects

**References:**

1. Barry, R.S. & Chorley, R.J. (1971): Atmosphere, Weather and Climate, ELBS, Methuen & Co. Ltd., U.S.A.
2. Griffiths, J.F.(1966): Applied Climatology-An Introduction, Oxford University Press, London.
3. Lal, D.S.(1997):Climatology, Sharda Pustak Bhawan, Allahabad.
4. Mather, J. R.(1974): Climatology: Fundamentals and Applications, McGraw Hill Book Co. New York.
5. McBoyle, G.(1973): Climate in Review, Houghton Mifflin Co., Boston.
6. Subrahmanyam, V.P.(ed)(1983):Contribution to Indian Geography, Heritage Publishers, New Delhi , a) Vol. III - General Climatology b) Vol. IV- Applied Climatology
7. Harp, H.J. and Trinidade, O.D. (eds) (1990): Climate and Development, Springer Verlag, U.S.A.
8. Oliver, J.E. and Hidose, J.J. (1984): Climatology - An Introduction, Charles and Merrill, U.S.A.
9. Robinson, P.J. and Hendersen-Sellers, A.(1999): Contemporary Climatology, Pearson Education, London

  
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## Semester I

### 103: Perspectives in Human Geography

No. of Credits: 4 Contact Hours 60 + Notional Hours 60= Total hours 120

#### Course Objectives:

1. To recognize the different perspectives in human geography
2. To illustrate the evolution of human societies with respect to rural and urban dynamics
3. To predict how different societies interact and depend on each other for existence and affect landscapes
4. To estimate the factors responsible for growth and changes in structure of population
5. To develop an understanding of the global patterns of migration
6. To compare the different urban morphologies in the world

#### Course Outcome:

1. **CO1:** Learners will be able to recognize the different perspectives in human Geography and related aspects (Level : Knowledge)
2. **CO 2:** Learners will be able to illustrate the evolution of human societies with respect to rural and urban dynamics (Level : Comprehension)
3. **CO 3:** Learners will be able to predict how different societies interact and depend on each other for existence and affect landscapes (Level : Application)
4. **CO 4:** Learners will be able to estimate the factors responsible for growth and changes in structure of population (Level : Analysis)
5. **CO 5:** Learners will be able to develop an understanding of the global patterns of migration (Level : Synthesis)
6. **CO 6:** Learners will be able to compare the different urban morphologies in the world (Level : Synthesis)

#### Detailed Syllabus

#### 1. Changing Perspectives in Human geography (16 hours)

- 1.1 Environmentalism- Possibilism-Neo-Possibilism - Areal differentiation
- 1.2 Post-fifty conceptualisation of Geographic Space-Perception studies- Locational analysis- Quantification- General systems theory: appraisal and criticism
- 1.3 Behaviouralism – Perception of environment- Humanistic Geography- Sense of place -Landscape studies - Emergence of welfare approach and its social relevance
- 1.4 Post 1980s trends - Radicalizing process in Geography- neo-Marxist interpretations and extensions- Neohumanism and other contemporary theorisations

#### 2. Evolution of Human Societies: Dynamics of rural and urban societies (Skill Development) (15 hours)



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**2.1 Evolution of Human Societies – Economic, Political and Cultural Transformation 2.2**  
Rural society: caste hierarchy, segregation in rural settlement – rural social morphology – critical understanding of Agricultural Landuse theory - Contemporary Indian rural society

**2.3 Urban society – Various models of urban morphology - Hierarchy of urban settlements- Application of Central Place theory and settlement hierarchy - Indian examples – Contemporary urban society -stratification and occupational divergence-residential segregation-Urban Heterogeneity and cosmopolitanism**

**2.4 Evolution tribal societies – characteristics – spatial distribution – Indian Examples**

**3. Interaction of human societies-Socio-Cultural identities- patterns and landscapes (15 hours)**

**3.1** Emergence and development of early cultural hearth – cultural diffusion, isolation and segregation

**3.2** Racial groups– biological divergence-blending-process of assimilation – behavioural and structural- acculturation

**3.3** Evolution of language – diffusion over space – evolution of linguistic provinces – relevant issues – language as basis of nation and states- Linguistic division in India

**3.4** Religion– contemporary dynamics – spatial pattern of major religions- Role of religion in the formation of nation-states

**3.5** Implications of race, religion, language and ethnicity- Contestation, conflicts and negotiations

**4. Dynamics of Population Change : Patterns, Processes and spatial distribution (Skill Development) (14 hours)**

**4.1** Components of Population Change – fertility, mortality and associated patterns - Demographic characteristics - developing and developed countries

**4.2** Population Growth – Attitudes and Interpretations – Malthusian, NeoMalthusianism and Marxist viewpoint – Club of Rome - Critical Understanding of Demographic transition theory – concept of Demographic dividend

**4.3** Population, Resources and Spatial Pattern of Development - Optimum population, over population and under population – Recent World Views

**4.4** Migration- early and subsequent migration – scales of migration – mechanism and laws – major theories - Typology of migration – Political, cultural and economic dimensions - Contemporary Trends in migration

**References:**

1. Aitken, S and Valentine, G. (2006), Approaches to Human geography, Sage.
2. Johnston, R.J., Gregory D. Pratt G. and Watts M., (2005, 5<sup>th</sup> ed.), the Dictionary of Human Geography, Blackwell.
3. Kitchin R., Thrift, N, (eds.) (2009), The International Encyclopedia of Human Geography, Elsevier.
4. Benko, G. and Strohmayer, U. (2004), Human Geography, a History for the 21<sup>st</sup> Century, Arnold, London.
5. Cloke, P., Crang, P., Goodwin, M., (2004), Envisioning Human Geographies, Arnold.

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6. Cloke, P. and Johnston, R.,(eds.), (2005), Spaces of Geographical Thought, Deconstructing Human Geography's Binaries, Sage.
7. Atkinson, D., Jackson, P., Sibley, D. and Washbourne, N. (eds.) (2005), Cultural Geography:A Critical Geography of Key Concepts, Tauris, I.B.
8. Norton William, (2002), Human Geography, Oxford, 4<sup>th</sup> edition
9. Barnes, T. and Gregory, D., 1997, Reading Human geography, Arnold.
10. Smith, D. M. (1977): Human Geography, A Welfare Approach, Arnold
11. Peet, R. (ed) (1987): Radical Geography, Maroufa Press, Rawat, New Delhi, 2003 12.
- Ambrose, P. G. (1969): Analytical Human Geography, Longman, London
13. De Blij, H. J. (1986): Human Geography, John Wiley & Sons, New York.
14. Vivello, F. R. (1978): Cultural Anthropology, McGraw Hill, USA.
15. Peet R. and Thrift, N. (eds) (1989): New Models in Geography, Vol. I & II, Unwin Hyman.
16. Ahmed, A. (1999). Social Geography, Rawat Publication, New Delhi.
17. Massey, D, Alien, J, P, Jarre, P (eds) (1999): Human Geography Today, Cambridge Polity Press.
18. Fellman, J (1997): Landscape of Human Activities, Brown and Benchmatic Pub.
19. Coates, B.E., Johnston, R.J. Knox, (1977): Geography and Inequality, Oxford University Press

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## Semester I

### Paper 104: Spatial Organisation of Economic activities

Maximum No. of Credits: 4 Maximum no. of lectures including continuous assessment: 60

#### Course Objectives:

1. To identify different economic systems
2. To describe the spatial distribution of economic activities
3. To apply the various economic theories to the present economic organization
4. To determine the spatio social organization of production and patterns of trade
5. To compare the past and present changes in the process of industrialization
6. To assess the barriers to economic development and its impacts on spatial

#### interactions Course Outcome:

1. **CO 1:** Learners will be able to recall the definition, nature and scope of economic geography (**Level : Knowledge**)
2. **CO 2:** Learners will be able to illustrate the different perspectives of the subject (**Level : Comprehension**)
3. **CO 3:** Learners will be able to modify the patterns and reasons of the existing spatial distribution of labour and economic activities (**Level : Application**)
4. **CO 4:** Learners will be able to distinguish between the roles of different agencies like WTO, GATT, TRIPS, SAARC etc. in international trade (**Level : Analysis**)

  
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5. **CO 5:** Learners will be able design locations for industrial establishments (Level : Synthesis)
6. **CO 6:** Learners will be able to compare the industrial location theories given by Losch, Myrdal, etc. (Level : Evaluation)

### Detailed Syllabus

#### 1. Organisation of an economy as a dynamic spatio-social system: Basic concepts (15 hours)

- 1.1 Economic organization and spatial change- Spatial division of labour and Interdependence
- 1.2 Geographic fixity and mobility- typology of distance-Spatial interaction and diffusion
- 1.3 Typology of Space - Absolute and Relative – Time and space convergence  
Production of economic space

#### 2. Spatial Organisation of World Economy (Skill Development) (15 hours)

- 2.1 Economic organization of the pre-colonial world - Rise of the Core Economies – industrial revolution in Europe
- 2.2 Colonialism and Geographies of inequities and uneven development –neocolonialism and structuration of world economy as core, periphery and semi-periphery
- 2.3 Flexibilisation of Production – Role of international Institutions like World Bank, IMF, UNCTAD
- 2.4 Evolution and Growth of Multinational Companies - Patterns and Processes of Globalisation

#### 3. Organisation of Production: Agriculture and Industry - Global Patterns and Trends (15 hours)

- 3.1 Agricultural Patterns-World Agricultural Regions – Theory of Agricultural Landuse and Critique - Technology, modernization and structuring of agrarian regions in colonial and post-colonial periods
- 3.2 Crisis of agriculture- Aspects of Food security and world patterns of hunger
- 3.3 World Industrial Regions – Factors and processes Influencing Location of industries – critical assessment of theories of industrial location
- 3.4 Globalisation and shifting location of industries - New Industrial Regions- EPZs and SEZs- South east and East Asian economies

#### 4. Spatio-social organization of production –Transport, Trade and Services: Global Patterns and trends (15 hours)

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4.1 Organisation of transport - Bases of Spatial Interaction – Theoretical Perspectives on Transport and inter-regional interactions - Role of transport cost- nodes-places, networks and flows- spatio-social accessibility – Indian Examples

4.2 International trade theory- classical, neo-classical and Marxist Perspectives - Critical review – Globalisation and changing structure and composition of International trade

GATT & WTO

4.3 Logic of Regional Integrations- Types and levels - Significance of regional integration as a strategy for the periphery - Case Studies - EU, OPEC, ASEAN, SAARC, BRICS

4.4 New Economic Activities and Globalisation : Finance and Service Industry- The Forth Industrial Revolution

### References:

1. Knox Paul, Agnew John and McCarthy Linda, (2008): The Geography of the World Economy, Hodder Education, UK.
2. Sheppard Eric and Barnes Trevor J., (eds.) (2000): A Companion to Economic Geography, Blackwell, Massachusetts.
3. Wood Andrew and Roberts Susan, (2011): Economic Geography- Places, network and flows, Routledge, London and New York.
4. Bryson John, Henry Nick, Keeble David and Martin Ron, (eds.) (1999): The Economic Geography Reader- Producing and Consuming Global Capitalism, John Wiley and Sons Ltd., New York.
5. Hartshorn A. Truman and Alexander W. John, Third edition, (2010): Economic Geography, PHI Learning Private Ltd., New Delhi
4. Liemt van Gijbert, (eds.) (1992): Industry on the move- Causes and consequences of International Relocation in the Manufacturing Industry, International Labour Office, Geneva.
5. Harrington J.W. and Warf Barney, (1995): Industrial Location- Principle, Practice and Policy, Routledge, London and New York.
6. Rodrigue Jean-Paul, Comtois Claude and Slack Brian, (2006): The Geography of Transport System, Routledge, London and New York.
7. Harrington J.W. and Warf Barney, (1995): Industrial Location- Principle, Practice and Policy, Routledge, London and New York.
8. Berry, B. J. L. et. Al. (1976): Geography of Economic Systems, Prentice Hall, Englewood Cliff.
9. Boyce, R. D. (1974): Bases of Economic Geography, Holt, Rinehart and Winston, New York
10. Conkling, E. C. & Yeates, M. (1976): Man's Economic Environment, McGraw Hill, London.
11. Hodder, B. W. and Lee, R. (1974): Economic Geography, Field of Geography Series, Methuen & Co. Ltd, London.
12. Hussain Majid (ed.), (1993): Perspectives in Economic Geography, Vols. 1-6, Anmol Publication, New Delhi.
13. Cole, J. P., (1983): Geography of World Affairs, Butterworths, London.
14. Lloyd, P. E. and Dicken, P. (1972): Location in Space, Harper & Row, San Francisco.
15. Lowe Moryadas, (1975): The Geography of Movement, Houghton Mifflin & Co.

  
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16. Smith, D. M (1971): Industrial Geography: An Economic Geographic Analysis, John Wiley & Sons.
17. Tarrant, J. R. (1974): Agricultural Geography, Problems in Modern Geography Series, John Wiley & Sons.
18. Willbanks, Thomas J (1980): Location and Well- Being, An Introduction to Economic Geography, Harper & Row, San Fransisco.

## Semester I

### Tools and Techniques of Spatial Analysis I

(Based on Theory Papers: 101 -102)

No. of Credits 4 Hours of Practical experience 60+ Notional Hours 60 Course

#### Objectives:

1. To identify geomorphic profiles of the given area
2. To illustrate the slopes of the area under study
3. To compute climate data of different regions
4. To differentiate between Indian and foreign toposheets
5. To construct diagrams to analyze climate data
6. To compare different methods of geographic data analysis

#### Course Outcome:

1. **CO 1:** Learners will be able to identify the techniques of drawing longitudinal and projected profiles (Level: Knowledge)
2. **CO 2:** Learners will be able to describe the methods of slope analysis like Wentworth's, Robinson's, and Smith's (Level : Comprehension)
3. **CO 3:** Learners will be able to apply the methods of altimetric analysis like ring contour method and highest grid cell elevation method (Level : Application)
4. **CO 4:** Learners will be able to differentiate between Indian and foreign topographical maps (Level : Analysis)
5. **CO 5:** Learners will be able to construct different climate graphs, maps and diagrams (Level : Application)
6. **CO 6:** Learners will be able to compare different methods of geographic data analysis (Level : Evaluation)

#### Detailed Syllabus

### 1. Techniques of Geomorphic Analysis (Skill Development) (20 hours)

#### A. Drawing Profiles:

- i. Longitudinal ii.



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Composite and Projected **B. Methods of Slope Analysis:**

- i. Wentworth's method of average slope determination
- ii. Robison's method of slope analysis'
- iii. G. H. Smith's method of slope analysis
- iv. Construction of Block Diagram

**C. Altimetric Analysis:**

- i. Ring contour method
- ii. Highest grid-cell elevation method

**2. Advance topographical Map Interpretation (Employability) (20 hours)**

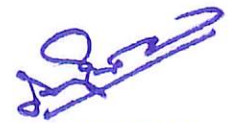
Interpretation of Indian and foreign topographical Maps: Aspects of Physical and Human Environment(OS, USGS and SOI)

**3. Techniques of Climatic Data Analysis (Skill Development) (20 hours)**

1. Rainfall dispersion diagrams
2. Wind roses
3. Water surplus-deficiency graphs
4. Climatograph
5. Climograph: Hyther graph, Taylor's climograph
6. Index of aridity and index of moisture
7. Isoleth Maps

**References:**

1. King, C. A. M. (1978): Techniques in Geomorphology, Edward Arnold, London.
2. Miller, A.A. (1966): The Skin of the Earth, Methuen, London.
3. Monkhouse, F.J. and Wilkinson, H.R. (1971): Maps and Diagrams, Methuen, London.
4. Cole, J.R and King, C.A.M. (1968): Quantitative Geography, John Wiley And Sons, London.
5. Goudie, A. (1981): Geomorphological Techniques, George Alien And Unwin, London.
6. Hammond, R. And McCullagh, P.S. (1974): Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
- Mahmood Aslam (1977): Statistical Methods in Geographical Studies, Rejesh Publication, New Delhi.
7. Singh, Gopal (2001): Map Work and Practical Geography, Vikas Publishing House Pvt. Ltd.
8. Singh, L.R. (2011): Fundamentals of Practical Geography, Sharda Pustak Bhavan, Allahabad.
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## Semester I

### Tools and Techniques of Spatial Analysis II

(Based on Theory Papers: 103 -104)

No. of Credits: 4 Practical Hours 60 + Notional Hours 60= Total hours 120 Course

#### Objectives:

1. To learn measures of central tendency like weighted mean and median center
2. To illustrate network analysis through its associated mapping
3. To construct diagrams for spatial data representation
4. To analyze the socio-economic conditions through a properly designed questionnaire
5. To develop understanding of computer processing of geographic data
6. To assess the different sources of data

#### Course Outcome:

1. **CO 1:** Learners will be able to learn measures of central tendency like weighted mean and median center (Level : Learn)
2. **CO 2:** Learners will be able to illustrate network analysis through its associated mapping (Level : Comprehension)
3. **CO 3:** Learners will be able to construct diagrams for spatial data representation (Level : Synthesis)
4. **CO 4:** Learners will be able to analyze the socio-economic conditions through a properly designed questionnaire (Level : Analysis)
5. **CO 5:** Learners will be able to develop understanding of computer processing of geographic data (Level : Synthesis)
6. **CO 6:** Learners will be able to assess the different sources of data (Level : Evaluation)

#### Detailed Syllabus

##### 1. Statistical Techniques

###### 1.1 Measures of Central Tendency (Skill Development) (24 hours)

a) Measures of central tendency: mean centre, weighted mean centre, median centre

b) Z score – different applications and interpretations.

###### 1.2 Network Analysis:

a) Topological graphs -Connectivity- Calculations of Alpha, Beta and Gamma

Indices.

b) Mapping of relative accessibility and connectivity – Matrices- point of minimum Aggregate travel distance

##### 2. Nature and application of spatial data (Skill Development) (20 hours)

2.1 Sources of data – Primary and secondary

2.2 Data types – qualitative and quantitative Spatial data and Aspatial

2.3 Scales of measurement of data: Nominal, Ordinal, Interval and Ratio – Symbolization and Representation – Interpretation and Relationships.

  
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## 2.4 Designing a questionnaire

### 3. Computer processing of geographical data (Employability) (16 hours)

- 3.1 Symbolisation, Preparation of matrix
- 3.2 Diagrammatic Representation.
- 3.3 Compilation of data
- 3.4 Computation of data: qualitative and quantitative data based on descriptive statistical measures application of computer programmes.

#### References:

1. Robinson, A. H. and Others (1995): Elements of Cartography, VI Edition, John Wiley & Sons, New York.
2. Anson, R. W. and Ormeling, F. J., (Ed.) (1993): Basic Cartography for Students and Technicians, Vol.I, International Cartographic Association and Elsevier Applied Science Publishers, London.
3. Dickinson, G. C. (1977) Statistical Mapping and the Presentation of Statistics, Edward Arnold Ltd., London.
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13. Baily, T.C., and Gatrell, A. C, (1995), Interactive Spatial Data Analysis, Prentice Hall, London
14. Griffith, D. A. , Layne, L.J.,(2002) A Casebook for Spatial Statistical Data Analysis: A Compilation of Analyses of Different Thematic Data Sets , Amazon.com
15. Wicox, P.R. (2003), Applying Contemporary Statistical Techniques, Academic Press, Amsterdam
16. Crang M. and Cook, I. 2007, Doing Ethnographies, Sage.

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## Semester II

### 201: Oceanography and Hydrology

No. of Credits: 4 Teaching Hours 60 + Notional Hours 60= Total hours 120 Course

#### Objectives:

1. To define the basic concepts related to oceanography
2. To illustrate formation and role of ocean currents and ocean resources
3. To apply the understandings of concepts of hydrology to the real world
4. To associate the concepts of watershed with water scarcity in the present era
5. To construct salinity, ocean current and temperature distribution maps
6. To compare the marine conditions across various oceans in the world

#### Course Outcome:

1. **CO 1:** Learners will be able to define the basic concepts related to oceanography like definition, nature and scope (Level: Knowledge)
2. **CO 2:** Learners will be able to illustrate formation and role of ocean currents and ocean resources in influencing global temperature (Level : Comprehension)
3. **CO 3:** Learners will be able to apply the understandings of concepts related to the hydrological cycle to the real world (Level : Application)
4. **CO 4:** Learners will be able to associate the concepts of watershed with water scarcity in the present era with reference to one's own area (Level : Analysis)
5. **CO 5:** Learners will be able to construct salinity, ocean current and temperature distribution maps for better understanding of spatial distribution (Level : Synthesis)
6. **CO 6:** Learners will be able to compare the marine conditions across various oceans in the world (Level :Synthesis)

#### Detailed Syllabus

1. **Fundamental Concepts in Oceanography** (15 hours)
  - 1.1 Definition, nature and scope of oceanography
  - 1.2 Age and origin of oceans, and ocean morphology.
  - 1.3 Distribution of temperature, salinity and density of oceans.
2. **Ocean Currents and Resources** (15 hours)
  - 2.1 Ocean currents: Atlantic, Pacific and Indian Oceans.
  - 2.2 waves and tsunamis, tides.
  - 2.3 Marine sediments and deposits
  - 2.4 Food and mineral resources of the sea.
3. **Introduction to Hydrology** (15 hours)
  - 3.1 Hydrological cycle, Factors affecting movement of water, Patterns of movement
  - 3.2 Water Budget, World water Resources,
  - 3.3 World Water Balance, Global Freshwater Resources,
  - 3.5 History of Hydrology



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**4 Watershed, Its Characteristics and Evaporation Process (Employability) (15 hours)**

**4.1 Topographic and Effective Watershed**

**4.2 Physiographic characteristics of a Watershed- Geometric & Drainage Network**

**4.3 Agro-Pedo Geological Characteristics – Soil Cover, Soil type, Geology 4.4 Metrological Factors influencing Evaporation- Physical Factors involved in Evaporation Process.**

**References:**

- i Agarwal A. and Narain, S. (1997), “Dying Wisdom: Rise, Fall and Potential of India’s Traditional Water Harvesting System”, CSE, New Delhi. 2. Andre Musy (2011) Hydrology a Science of Nature, Science Publishers, New Hampshire.
- ii Centre for Science and Environment (2002), “Citizens Report”, New Delhi.
- iii Charlu, T.G.K. and Dutt, D. K. (1982), “Ground Water Development in India” Rural Electrification Corporation, New Delhi.
- iv Chorley, R. J. (1967), “Water, Earth and Man”, Methuen, London.
- v Chorley, R. J. (1969), “Introduction to Physical Hydrology”, Methuen, London.
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- vii Jones, J. A. (1997), “Global Hydrology : Processes, Resources and Water Management”, Longman, London.
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- ix Mather, J. R. (1984), “Water Resources : Distribution, Use and Management”, John Wiley, Maryland.
- x Singh, R. A. and Singh, S. R. (1972), “Water Management: Principles and Practices”, Tara Publication, Varanasi.
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- xii Todd, D. K. ((1959), “Ground Water Hydrology”, John Wiley, New York.
- xiii Stewart, R. H. (2008). *Introduction to Physical Oceanography*.
- xiv Garrison, T. (2012). *Essentials of Oceanography* (Sixth Edit). Brooks/Cole, Cengage Learning.
- xv Singh, S. (2014). *Oceanography*. Allahabad: Pravalika Publications.
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## Semester II

### 202: Geoinformatics

No. of Credits: 4 Teaching Hours 60 + Notional Hours 60= Total hours 120

#### Course Objectives:

1. To define the fundamental concepts of remote sensing
2. To explain the various remote sensing platforms and sensors
3. To construct spatial data models in GIS
4. To associate GIS with GPS
5. To compare between satellite imageries, aerial photographs, and GIS outputs
6. To justify the reasons for the existing land uses from the imageries, photographs and other maps

#### Course Outcome:

1. **CO 1:** Learners will be able to define the fundamental concepts of remote sensing like electromagnetic spectrum, aerial photography, principles of photogrammetry, etc.  
(Level : Knowledge)
2. **CO 2:** Learners will be able to explain the various remote sensing platforms and sensors, basics of projections, datum and coordinate reference system (Level : Comprehension)
3. **CO 3:** Learners will be able to construct spatial data models in gis for solution modeling  
(Level : Synthesis)
4. **CO 4:** Learners will be able to associate gis with GPS and work with them together (Level : Analysis)
5. **CO 5:** Learners will be able to compare between satellite imageries, aerial photographs, and GIS outputs for better results (Level : Synthesis)
6. **CO 6:** Learners will be able to justify the reasons for the existing land uses from the imageries, photographs and other maps (Level : Evaluation)

#### Detailed Syllabus

##### 1. Unit – I

(15 hours)

- 1.1 Fundamentals of Remote Sensing: Definition and Concept, Process of Remote Sensing, Development of remote sensing – Global and Indian
- 1.2 Electromagnetic Spectrum: Definition and Concept, interactions with atmosphere and earth's surface, Atmospheric window, Black body
- 1.3 Spectral Reflectance Curve: Concept, curves for land, water bodies/oceans, vegetation In Optical, IR, Thermal and Microwave bands
- 1.4 Fundamentals of aerial photography: Concept of stereoscopy and photogrammetry, geometric types of aerial photographs, photographic scale,



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measurements of distance, area and height, relief displacement, stereoscopic parallax, flight planning.

**2. Unit – II (15 hours)**

- 2.1 Platforms and Orbits: types of platforms, types of orbits
- 2.2 Sensing of electromagnetic energy: Measurement of radiance, conversion of radiance to digital number
- 2.3 Resolutions and Sensors: Types of resolutions, Remote Sensors and types based on resolutions and sources of illumination, overview of space borne sensors.
- 2.4 Visual Image Interpretation: Image display and color composites, elements of visual image interpretation

**3. Unit – III (Employability) (15 hours)**

- 3.1 Fundamentals of Databases: Data storage, basic file structures, types of database, advantages of database, spatial and non-spatial databases, scales of measurement, Entity  
– Relationship Model, SQL,
- 3.2 Geographic Information System: Definition, concept, components, functions and applications.
- 3.3 Spatial Data Models: Vector and Raster, Vector representation (point, line, area and TIN), Concepts of arc, node, vertices and topology.
- 3.4 Coordinate Reference Systems: Geographic and Projected, Map Projections and Datum for GIS data.

**Unit – IV (Skill Development) (15 hours)**

- 4.1 Vector-based spatial analysis: single layer operations (extraction and proximity) and multilayer operations (overlay operations),
- 4.2 Raster-based spatial analysis: Georeferencing, Spatial Interpolation and raster generation, raster reclassification, arithmetic, relational and logical operations
- 4.3 Global Positioning System: Segments of satellite-based positioning systems, main systems – NAVSTAR, GLONASS, Galileo and Indian GPS
- 4.4 Principles of positioning: Positional Accuracies, Relative Positioning, errors and sources

**Reference Books:**

1. Agrawal, N.K.(2006), Essentials of GPS (Second Edition), Book Selection Centre, Hyderabad
2. American Society of Photogrammetry (1983): Manual of Remote Sensing, ASP Palis Church, V.A.
3. Barrett, E.G. and Curtis, L.F. (1992): Fundamentals of Remote Sensing in Air Photointerpretation, McMillan, New York. 7.
4. Bernhardsen, Tor (2002): Geographical Information Systems: An Introduction, Third Edition, John Wiley & Sons, Inc., New York.
5. Burrough, Peter A and McDonnell, R.A. (1998): Principles of Geographical Information Systems, Oxford University Press, Mumbai.

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17. Shekar, S and Chawla, S, (2009), Spatial Databases: A Tour, Pearson Education, Delhi. 18. Tempfli, T. K., Kerle, N., Huuremema, G.C., and Janssen, L.L.F (2009), Principles of Remote Sensing, ITC, Netherlands.



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## Semester II

### 203: Socio-Cultural and Political Geography

No. of Credits: 4 Contact Hours 60 + Notional Hours 60= Total hours 120 Course

#### Objectives:

1. To identify the different perspectives in Social Geography
2. To summarize the concepts of marginalization and exclusion
3. To modify the traditional gender roles in the society
4. To determine the spatial dynamics of political processes
5. To develop understanding of urbanization processes globally
6. To judge the differences in society and related aspects

#### Course Outcome:

1. **CO 1:** Learners will be able to identify the different perspectives in social geography and the trends and approaches (Level : Knowledge)
2. **CO 2:** Learners will be able to summarize the concepts of marginalization and exclusion (Level : Comprehension)
3. **CO 3:** Learners will be able to modify the traditional gender roles in the society like working women, transgender and female literacy (Level : Application)
4. **CO 4:** Learners will be able to determine the spatial dynamics of political processes (Level : Analysis)
5. **CO 5:** Learners will be able to develop understanding of urbanization processes globally ad in India (Level : Comprehension)
6. **CO 6:** Learners will be able to judge the differences in society and related aspects like boundary (Level : Evaluation)

#### Detailed Syllabus

1. **Social and cultural Geography – Major Perceptions (15 Hours)**
  - 1.1 Evolution and development of Social Geography – Major Trends and Approaches- Critical Perspective and Associated Theoretical Developments
  - 1.2 Emergence of cultural Geography as a major branch - Traditional cultural geography – New cultural geography -linguistic and literary studies, Semiotic analysis and ‘space’ theories - critical social theory
  - 1.3 Human activities and spatial patterns - Production of socio-cultural space – factors, forces and processes – Resultant socio-spatial structures - A temporal scale
2. **Marginalisation and exclusion (15 Hours)**
  - 2.1 Social inequality and Social stratification - the ‘difference’ between ‘self’ and ‘other’ – social execution of ‘difference’ and exclusion – religious and ethnic identities



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- 2.2 Imagining local, regional and national identities- multicultural spaces – cultural pluralism and identity politics in India.
- 2.3 Spaces of contestations and conflicts - Poverty and Living in Ghettos and slums in globalizing cities- Gentrification, displacement and right to city – SEZ s in India- Issues of right to livelihood.

### 3. Gender and Geography

(15 Hours) 3.1 Body as

- place- private and public domains- Role of Patriarchy – State – Capitalist production.
- 3.2 Space-society perspective- Structuring of sexuality and construction of gender identity – role of socio-cultural forces and processes- stigmas and taboos – resultant gendered spaces Indian examples – globalization and repositioning of gender
- 3.3 Spatiality of sex ratios – intra-regional and inter-regional – specific examples of India and China - feminization of labour and status of women workers – experiences from the global periphery.
- 3.4 Women and human development status – Human rights and legal space for women, Glass Ceiling- Indian context.

### 4. Spatial Dynamics of Political Processes

(15 Hours)

- 4.1 Concepts and images of territoriality, state, nation and nation- state - colonialism and post-colonial context
- 4.2 Theoretical perspectives on global political structure- critical analysis of heart land and rim land theories - Relevance of World Systems approach- Core-periphery structure
- 4.3 Boundary and Frontier concepts- Terrestrial and maritime context- Processes of boundary formation- cultural and ethnic identities. (Skill Development)
- 4.4 Dynamics of electoral politics- Indian context - Globalisation and contemporary geopolitics - Politics of resources – oil resources and West Asia – water Resources and South Asia

#### References:

1. Peet, R. (1998), Modern Geographical Thought, Blackwell
2. Peet, R. and Thrift, N. (eds.) (2002), New Models in Geography, Unwin Hyman.
3. Barnes Trevor and Gregory Derek, (eds.) (1997): Reading Human Geography- The Poetic and Politics of Inquiry, Arnold, London.
4. Daniels Stephen and Lee Roger, (eds.) (1996): Exploring Human Geography- A Reader, Arnold, London.
5. Cloke, P. and Johnston, R., (eds.), (2005), Spaces of Geographical Thought, Deconstructing Human Geography's Binaries, Sage.
5. Aitken, S and Valentine, G. (2006), Approaches to Human geography, Sage.
6. Soja E., (1997), Postmodern Geographies- The Reassertion in Critical Theory, Rawat, New Delhi.
7. Johnston, R.J., Gregory D. Pratt G. and Watts M., (2005, 5<sup>th</sup> ed.), the Dictionary of Human Geography, Blackwell.
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10. Dear J. Michael and Flusty Steven, (eds.) (2002): The Spaces of Post Modernity, Blackwell, Massachusetts.
11. Benko Georges and Strohmayr Ulf, (eds.) (2004): Human Geography- A History for the 21<sup>st</sup> Century, Arnold, London.
12. Atkinson, D., Jackson, P., Sibley, D. and Washbourne, N. (eds.) (2005), Cultural Geography, A Critical Geography of Key Concepts, Tauris, I.B.



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15. Banerjee-Guha, S. (2004), *Space, Society and Geography*, Rawat, New Delhi.
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## Semester II

### Paper 204: Urban Geography

No. of Credits: 4 Teaching Hours 60 + Notional Hours 60= Total hours 120 **Course**

#### **Objectives:**

1. To name the process of urbanization and urban systems
2. To interpret interconnection between urbanization, capitalism, and development
3. To apply the various perspectives on urban planning
4. To associate urban transformation and changing socio-economic and environmental conditions
5. To develop a solution model to minimize the impacts
6. To compare the process of urbanization among different places on Earth **Course**

#### **Outcome:**

1. **CO 1:** Learners will be able to name the process of urbanization and urban systems (Level : Knowledge)
2. **CO 2:** Learners will be able to interpret interconnection between urbanization, capitalism, and development (Level : Comprehension)
3. **CO 3:** Learners will be able to apply the various perspectives on urban planning (Level : Application)
4. **CO 4:** Learners will be able to associate urban transformation and changing socioeconomic and environmental conditions (Level : Analysis)
5. **CO 5:** Learners will be able to develop a solution model to minimize the impacts (Level : Synthesis)
6. **CO 6:** Learners will be able to compare the process of urbanization among different places on earth (Level : Evaluation)

### Detailed Syllabus

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## 1. Urbanisation Process and Urban Systems

(15 Hours)

- 1.1 The bases of urbanisation- Demographic, economic and social aspects- Origins of the cities- Urbanisation Trends – urban fringe, urban sprawl and suburbanisation
- 1.2 Urban Landuse – various approaches – Classical, Neo-classical approaches - Human Ecology, land economics, activity systems
- 1.3 Urban location of economic activities – Urban morphology and landuse- Critical perspective
- 1.4 Urban System- Evolution, growth and organisation - Primacy, hierarchy and balance – urban functions and Town classification

## 2. Urbanisation Process, Capitalism and development

(15 Hours)


- 2.1 Capitalism and urban development - Urbanisation in the industrialised world -Political economy of urbanisation.
- 2.2 Urbanisation in the Third World - Concept of peripheral urbanisation - Salient characteristics- slums and Urban poverty- Capitalism and urban development - Urbanisation in the industrialised world
- 2.3 Colonial and post-colonial structure – Concepts of dualism and urban economic base in Third World Cities
- 2.4 Theoretical Perspectives on role of Cities in regional and national development – cumulative Causation- Core and Periphery and growth pole theory - Top-down and bottom-up approach of urban and regional Planning

## 3. Perspectives on Urban Planning with Special Reference to India (15 Hours)

- 3.1 Indian experience of urban planning through 5 Year Plans – First Five Year Plan To Sixth Five Year Plan - Primate urban structure and associated problems – growth poles – policies of decongestion, decentralisation and planned towns – successes and failures , Indian Urban and Housing Policies
- 3.2 Changing Perspective on city planning – Seventh, Eighth and Ninth Five Year Plan – Intersection of global processes – Flexibilised urban economy – Changing Economic Base and International Capital - Informalisation and Feminisation of urban economy
- 3.3 Recentralisation – international capital and formation of global city - Processes and patterns of urban renewal- Crisis in urban space- Gentrification and other Emerging issues.
- 3.4 Global city and global city-region – new regionalism - transformation of the periurban regions of the Global South

## 4 Understanding the Urban Transformation with Special Reference to Mumbai Metropolitan Region (Skill Development) (15 Hours)

- 4.1 Gentrification in the Mill-land of Mumbai and the plight of the textile workers
- 4.2 Slum redevelopment in Mumbai- the case of Dharavi
- 4.3 Issues of urban planning and environment in Vasai- Virar Subregion
- 4.4 Mumbai a reclaimed city and challenges in urban planning.
- 4.5 The Planned City of New Mumbai: A Critical Perspective

  
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## Semester II

### Tools and Techniques of Spatial Analysis III

(Based on Theory Papers: 201-202)

No. of Credits: 4 (Practical Hours 60+ Notional Hours 60) Course

#### Objectives:

1. To memorize the essentials of image processing
2. To illustrate the various techniques of map making
3. To prepare a perfect map layout
4. To analyze spatial database by overlaying several layers
5. To create various vector layers in the GIS software



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6. To compare between the map and the real world

**Course Outcome:**

1. **CO 1:** Learners will be able to memorize the essentials of image processing like identifying the objects, stereo vision, etc. (Level : Knowledge)
2. **CO 2:** Learners will be able to illustrate the various techniques of map making like tracing and digitization from the imagery/ photograph (Level : Comprehension)
3. **CO 3:** Learners will be able to prepare a perfect map layout in the GIS software (Level : Application)
4. **CO 4:** Learners will be able to analyze spatial database by overlaying several layers (Level : Analysis)
5. **CO 5:** Learners will be able to create various vector layers in the GIS software point, line, polygon (Level : Synthesis)
6. **CO 6:** Learners will be able to compare between the map and the real world with the help of area and distance calculation (Level : Evaluation)

**Detailed Syllabus**

**1. Unit – I (Skill Development) (Hours 25)**

- 1.1 Aerial Photography: Construction of stereo vision, Photo Interpretation and preparation of photo map, Determination and application of scale for distance, area and Determination height. Image Interpretation, Conjunctive use of Map, Aerial Photographs and Satellite Imagery
- 1.2 Georeferencing: Map to map, image to map and assigning projection and choosing datum
- 1.3 Digitization: preparation of vector layers, vector editing, linking of spatial and attribute data.
- 1.4 Thematic mapping techniques: symbolization, labelling, representation of quantitative data, vector layer classification.

**2. Unit – II (Skill Development) (Hours 15)**

- 2.1 Vector overlay, buffer, extraction
- 2.2 Point in polygon, line in polygon,
- 2.3 Data retrieval – Attribute and Spatial query
- 2.4 Map Layout and Design

**3. Unit – III (Skill Development) (Hours 20)**

- 3.1 Spatial Interpolation and raster reclassification
- 3.2 Application of Raster calculator
- 3.3 Drainage Network Analysis
- 3.4 GPS Survey (Employability)

**Reference Books:**

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## Semester II

### Tools and Techniques of Spatial Analysis IV

**Based on Theory Papers: (203-204)**

No. of Credits: **4** (Hours of doing Practicals **60+** Notional Hours **60**) **Course**

**Objectives:**

1. To memorize the various techniques of map making
2. To describe the techniques of population hierarchy and population
3. To demonstrate the art of making mental maps and diagrams
4. To analyze the statistical techniques to analyze spatial pattern
5. To compute spatial concentration indices
6. To justify the existing spatial patterns in the world

**Course Outcome:**



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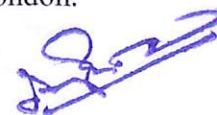
1. **CO 1:** Learners will be able to memorize the various techniques of map making (Level : Knowledge)
2. **CO 2:** Learners will be able to describe the techniques of population hierarchy and population (Level : Comprehension)
3. **CO 3:** Learners will be able to demonstrate the art of making mental maps and diagrams (Level : Application)
4. **CO 4:** Learners will be able to analyze the statistical techniques to analyze spatial pattern (Level : Synthesis)
5. **CO 5:** Learners will be able to compute spatial concentration indices (Level : Application)
6. **CO 6:** Learners will be able to justify the existing spatial patterns in the world (Level : Evaluation)

### Detailed Syllabus

1. **Settlement Hierarchy and population studies: (Skill Development) (25 Hours)**
  - 1.1 Settlement Hierarchy
    - a. Nearest neighbour analysis
    - b. Population and functional – rank- size rule – application and interpretation - degree of primacy - Construction- Interpretation – application of triangular graph
  - 1.2 **Application of Statistical and Cartographic Techniques:**
    - a. Choropleth, Isopleths Dot map and Population Pyramids
    - b. Diagrammatic Representation: One, Two and Three Dimensional-Construction and Interpretation
2. **Mental Maps and diagrams (15 Hours)**
  - 2.1 Typology of distance and direction of space- Construction of Maps
  - 2.2 **Imagining Place and space: Perception – mapping and interpretation. (Employability)**
  - 2.3 Interpreting political context of maps, cartographic techniques, diagrams, pictures and cartoons.
3. **Statistical Techniques to understand the spatial pattern (Skill Development) (20 Hours)**
  - 3.1 Index of concentration: location quotient and concentration.
  - 3.2 Index of similarity and dissimilarity and inequality- Construction and applicability of Lorenz curve- Interpretations
  - 3.3 Calculation of Ginni's co-efficient of concentration

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### Annexure I

**Department of Geography**

**University of Mumbai**

**Two Year Degree Course of M. A./M.Sc. in Geography**

**As per Choice Based Credit System (CBCS)  
(With effect from the academic year 2016-2017)**

**Question Paper Pattern for Semester I and II**

**Theory Paper:** 100 marks for each paper (Total papers 4)

**Internal examination:** Total marks 40 (in each theory paper)

**External examination:** Total marks 60 (in each theory paper)



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- i) Total no. of questions to be framed for theory paper in external examination: 6; 15 marks each.
- ii) Out of the 6 questions, students are required to attempt **any four** questions.

**Practical Paper:** 100 marks for each paper (Total papers 2)

**I & II End Semester Question Paper in Practicals-**

**A: External examination: Total Marks- 100**

- i) Students are expected to attempt **total four** questions of **20 marks** each i.e. **80 marks**
- ii) Marks for Journal – **10** iii) Marks for Viva-voice - **10** iv) **All questions are compulsory**
- v) Questions would correspond with number of major modules in the respective practical Course syllabus.

External Examiner be invited for conducting Practicals and paper setting and assessment of Theory and Practicals

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# UNIVERSITY OF MUMBAI



## Revised Syllabus for the M.A. & M.Sc.

**Program: M.A. & M.Sc.**

**Course: Geography**

**(Semester III)**

(As per Choice based Credit System with effect from the academic year 2017 2018)

**Choice Based Credit System Syllabus, 2017-18**

Total No. of Credits offered: 100

Electives offered in a particular academic year in each group could vary.

Semester is 15 weeks duration. Credits are defined for a semester

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**Paper 301: Research Methodology in Geography**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

1. To acknowledge students with the basics of research and its methodology
2. To interpret the results with the help of research hypothesis and its testing
3. To compute and analyze geographic data
4. To distinguish between the different levels of measurement
5. To compile a research report
6. To justify the research with the help of statistical measures

**Course Outcome:**

1. **CO 1:** Learners will be able to acknowledge students with the basics of research and its methodology (**Level : Knowledge**)
2. **CO 2:** Learners will be able to interpret the results with the help of research hypothesis and its testing (**Level : Comprehension**)
3. **CO 3:** Learners will be able to compute and analyze geographic data (**Level : Application**)
4. **CO 4:** Learners will be able to distinguish between the different levels of measurement (**Level : Analysis**) (**Local development skills**)
5. **CO 5:** Learners will be able to compile a research report (**Level : Synthesis**)
6. **CO 6:** Learners will be able to justify the research with the help of statistical measures (**Level : Evaluation**)

**Detailed Syllabus**

**1. Introduction to Research Methodology**

**(15 Contact Hours)**

- 1.1. Defining research- Methods of research types, significance of geographical research, research ethics
- 1.2. Scientific method in geographical studies, inductive and deductive, basic elements and attributes, Scale of research: Macro, Meso, Micro Problem formulation and identification.
- 1.3. Review of Literature: Significance and sources of literature review (**Skill Development**)
- 1.4. Research Design: meaning, stages, characteristics and significance of research design (**Skill Development**)



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**2. Research Hypothesis and Sampling (15 Contact Hours)**

2.1. Meaning of Hypothesis, relevance and types of hypothesis

2.2. Identification of problem and hypothesis: Problem identification, statement of hypothesis, testing of hypothesis, generalization (Skill Development)

2.3. Sampling: Meaning and importance, types of sampling

2.4. Selection of sample and size of sample

**3. Nature and Analysis of Geographical Data (15 Contact Hours)**

3.1. Nature and type of Geographical data, significance of spatial and temporal data in geographical studies

3.2. Levels of measurements: Nominal, Ordinal, Ratio and Interval

3.3. Methods and sources of geographical data collection: conventional and modern; limitations of secondary data and need for data generation, collection of primary data: questionnaires and schedules, field work, sample surveys and their significance (Skill Development)

3.4. Geographic Data analysis: Qualitative, Quantitative and Advanced techniques of geographic data processing and analysis, geographical matrix and its significance in analysis of Geography data (Skill Development)

**4. Scientific Report Writing (Employability) (15 Contact Hours)**

4.1. Introduction- aim and objectives, data and methodology

4.2. Data analysis, result, conclusion

4.3. Referencing system, weblography and bibliography.

4.4. Plagiarism, design, concept of impact factor, citation, DOI

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- 10) Keates, J.S.(1996) : Understanding Maps, 2<sup>nd</sup>Edn; Longman group limited, London.
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- 12) Maling .H. (1973) : Co ordinates systems and map projections, George Philip, London.
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- 21) Shaw G and Wheller D. (1985): Statistical techniques in geographical analysis. John Wiley and sons,
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- 24) Taylor, P.J.(1977): Quantitative Methods in Geography. HoughtonMifflim Company, Boston University Press.
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**Paper: 302: Climatology of the Tropics**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

1. To identify the basics of climatology of tropics
2. To summarize the atmospheric conditions of tropics
3. To compute the indices of climate of tropics
4. To determine the reasons behind tropical disturbances
5. To develop a heat budget of an area
6. To appraise the reasons behind cyclones all over the globe

**Course Outcome:**

1. **CO 1:** Learners will be able to identify the basics of climatology of tropics like El Nino, and heat budget (**Level : Knowledge**)
2. **CO 2:** Learners will be able to summarize the atmospheric conditions of tropics like stability, instability, air masses, fronts and their impacts on weather (**Level : Comprehension**)
3. **CO 3:** Learners will be able to compute the indices of climate of tropics (**Level: Application**)
4. **CO 4:** Learners will be able to determine the reasons behind tropical disturbances (**Level : Analysis**)
5. **CO 5:** Learners will be able to develop a heat budget of an area (**Level : Synthesis**)
6. **CO 6:** Learners will be able to appraise the reasons behind cyclones all over the globe (**Level : Evaluation**)

**Detailed Syllabus**

**1. Introduction**

**(15 Contact Hours)**

- 1.1. Concept of Tropical Climate and tropical boundaries.
- 1.2. Importance of tropical climate.
- 1.3. Role of tropics in the general circulation of atmosphere- driving forces-jet streams and their influence.
- 1.4. Heat budget of the tropics.

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## 2. Atmospheric conditions of Tropics

(15 Contact Hours)

- 2.1. Atmospheric stability and instability
- 2.2. Air masses and fronts
- 2.3. Classification and characteristics of air masses
- 2.4. Air masses over tropical region

## 3. Indices of climate in Tropics

(15 Contact Hours)

- 3.1. Atmospheric and oceanic oscillations on various time scales
- 3.2. Climate variability of tropical weather systems and their relationship with different oscillations.
- 3.3. Genesis of monsoon-distributional characteristics and variability of monsoon.
- 3.4. Classification of tropical climate- Climatic types in Tropics based on schemes of Koppen Thornthwaite and Penman. (Skill Development)

## 4. Tropical Disturbances

(15 Contact Hours)

- 4.1. Cyclones, thunderstorms, tornadoes their characteristics
- 4.2. Frequencies and paths of disturbances
- 4.3. Cyclones in Bay of Bengal and Arabian Sea (Skill Development)
- 4.4. Impacts of cyclones

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**Paper: 303: Geography of South Asia with special reference to India**

**No. of Credits: 6      Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

1. To recognize the physiographic aspects of South Asia
2. To describe the historical context which led to organization of society
3. To produce difference between pre-colonial, colonial, and post-colonial economic ideologies
4. To analyze the organization of economy in South Asia
5. To compare the geopolitical and intra-regional relations and development in different countries
6. To assess the existing trade patterns and its impact on mankind and economy

**Course Outcome:**

1. **CO 1:** Learners will be able to recognize the physiographic aspects of South Asia like geology, drainage, climate and soil (**Level : Knowledge**)
2. **CO 2:** Learners will be able to describe the historical context which led to organization of society (**Level : Comprehension**)
3. **CO 3:** Learners will be able to produce difference between pre-colonial, colonial and post-colonial economic ideologies (**Level : Application**)
4. **CO 4:** Learners will be able to analyze the organization of economy in South Asia (**Level : Analysis**)
5. **CO 5:** Learners will be able to compare the geopolitical and intra-regional relations and development in different countries (**Level : Synthesis**)
6. **CO 6:** Learners will be able to assess the existing trade patterns and its impact on mankind and economy (**Level : Evaluation**)

**Detailed Syllabus**

**1. Physiography of South Asia**

**(Contact Hours 15)**

- 1.1 Geological Evolution-Relief , topographic characteristic features
- 1.2 Drainage - major river systems    spatial pattern of water distribution



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1.3 Climate factors and processes responsible for shaping climate - pattern and regional variations

1.4 Soil and Vegetation interrelation and regional variations

## **2. Historical Context- Organisation of Society (Contact Hours 15)**

2.1 Pre-colonial societies and cultural evolution - Historical Background of Colonisation Impact on social, cultural and political organisation of society

2.2 Partition and emergence of independent nation state- Consequences, conflicts and identity politics - Regional Dynamics- Differences and Shared Characteristics

2.3 Demographic characteristics language, religion, race - Patterns of Migration assimilation and segregation -contestations and cultural politics

2.5 Social, cultural and political institutions their role in shaping identities of people and national identities

## **3. Organisation of Economy (Contact Hours 15)**

3.1 Agricultural development in South Asia- Colonial and post-colonial trends- Globalisation and status of agriculture status of small and marginal farmers - issues of corporatisation

3.2 Industrialization- Genesis and trends New economic policy- Globalisation - Role of the MNCs - Growth of services and finance New economic activities and transformation of economic base

3.3 Urbanisation and economic growth- Contemporary urban systems- Globalising cities- Global capital regions and the urban crisis

3.4 Trade relations intra-regional patterns and associations SAPTA success and failure

## **4. Geo-politics, intra-regional relations and Development (Skill Development) (Contact Hours 15)**

4.1 The Challenge of regionalism Intra and Inter-regional interaction conflicting Frontiers and border states - Geopolitics of resources like water , land and maritime resources Issues of Terrorism

4.2 Regional cooperation - SAARC prospects and challenges Critical assessment of role of India

4.3 new inter-regional coalitions and its impact on South Asian Intra-regional interaction AIDB / CPEC / BRICS

4.4 Politics of development and resources - Status of development - contemporary modes of governance - Quality of life and index of socio-economic well-being Regional variations

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### Practical Paper 304: Tools and techniques of Spatial Analysis- V

No. of Credits: 6 Teaching Hours 60 + Notional Hours 60 = Total Hours

120

#### Course Objectives:

7. To select the appropriate quantitative analysis technique using SPSS
8. To classify environmental indicators and understand their importance
9. To compute environmental data collected from a field survey
10. To differentiate between the statistical techniques like chi-square, ANOVA, correlation and regression
11. To compile a field study report
12. To justify the results obtained from environmental research

#### Course Outcome:

1. **CO 1:** Learners will be able to select the appropriate quantitative analysis technique using SPSS to test the data (**Level : Knowledge**)
2. **CO 2:** Learners will be able to classify environmental indicators and understand their importance in real world (**Level : Comprehension**)
3. **CO 3:** Learners will be able to compute environmental data collected from a field survey and process it (**Level : Application**)
4. **CO 4:** Learners will be able to differentiate between the statistical techniques like chi-square, ANOVA, correlation and regression used for testing hypothesis (**Level : Analysis**)
5. **CO 5:** Learners will be able to compile a field study report (**Level : Synthesis**)
6. **CO 6:** Learners will be able to justify the results obtained from environmental research (**Level : Evaluation**)



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## Detailed Syllabus

1. **Quantitative Techniques for Spatial Analysis using SPSS (Skill Development)**  
**(Contact Hours 20)**
  - 1.1. **Inferential statistics:** Introduction; Hypothesis Testing - Chi square test, T-test applications; Analysis of variance (ANOVA).
  - 1.2. **Time Series Analysis-** growth and decline- index numbers- logarithmic scale- trend line by least square method
  
2. **Quantitative Techniques for Spatial Analysis using SPSS (Skill Development)**  
**(Contact Hours 20)**
  - 2.1. **Correlation:** Types of correlation; Methods of correlation- Spearman's rank correlation and Karl Pearson's coefficient of correlation; Partial Correlation.
  - 2.2. **Regression:** Introduction; Dependent and independent variables; scatter-gram- regression lines and residuals; construction of regression lines; least square method, Regression residuals: mapping and interpretation.
  
3. **Environmental Indicators (Skill Development)** **(Contact Hours 15)**
  - 3.1. **Noise Pollution:** Introduction; Use of sound measuring device; temporal and spatial variation mapping based on primary data.
  - 3.2. **Water Pollution:** Introduction; identification, techniques used, temporal and spatial variation mapping based on primary data.
  
4. **Study Tour, Field Survey and Field Report. (Employability) (Contact Hours 5)**

### References:

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2. Berry, B.J.L. and Marble, D.F. (1968): Spatial Analysis A Reader in Statistical



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  7. Ganesh, A.(2006): GPS Principles and Applications, Satish Series Publishing Houses
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**Practical Paper 305: Tools and techniques of Spatial Analysis-**

**VI**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60 = Total Hours**

**120**

**Course Objectives:**

13. To recall the techniques interpreting O.S. sheets and topographical maps
14. To illustrate their observations in the toposheets and thematic maps
15. To apply statistical measures in spatial analysis in development studies
16. To estimate levels of development through Rank, Quartile and Z score methods
17. To development maps with the help of geographic data related to indicators of development
18. To assess the reasons behind the different levels of development

**Course Outcome:**

1. **CO 1:** Learners will be able to recall the techniques interpreting O.S. sheets and topographical maps to understand the landscape (**Level : Knowledge**)
2. **CO 2:** Learners will be able to illustrate their observations in the top sheets and thematic maps with the help of sketches and interpretation (**Level : Comprehension**)
3. **CO 3:** Learners will be able to apply statistical measures in spatial analysis in development studies (**Level : Application**)
4. **CO 4:** Learners will be able to estimate levels of development through rank, quartile and z score methods (**Level : Analysis**)
5. **CO 5:** Learners will be able to development maps with the help of geographic data related to indicators of development (**Level : Synthesis**)
6. **CO 6:** Learners will be able to assess the reasons behind the different levels of development (**Level : Evaluation**)



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## Detailed Syllabus

### 1. S.O.I. Topographical maps

(Contact hours 25)

1.1. Introduction Index to sheet- Scales- Conventional signs and symbols

1.2. Study and interpretation of topographical maps with reference to:

- i) Glacial; Fluvial, Aeolian and Coastal landforms
- ii) Drainage pattern
- iii) Land-use
- iv) Settlement
- v) Transport and Communication

1.3. Study and interpretation of O.S sheets and USGS maps and Land-use.

### 2. Thematic Maps

(Contact Hours

15)

2.1. Thematic maps: Physical - Interpretation of NATMO thematic maps.

2.2. Thematic maps: Socio-Cultural - Interpretation of NATMO thematic maps.

2.3. Thematic maps: Economic - Interpretation of NATMO thematic maps.

### 3. Spatial Analysis in Development Studies

(Contact Hours

20)

3.1. Measuring Development- Choice and relevance of indicators

3.2. Methods of measurement- Rank, Quartile and Z score methods.

3.3. Identification of levels of Development- Mapping and interpretation of Levels of development. (Skill Development)

### References:

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**Annexure I**

**Department of  
Geography**

**University of  
Mumbai**

**Two Year Degree Course of M. A./M.Sc. in  
Geography**

**As per Choice Based Credit System (CBCS)  
(With effect from the academic year 2017-  
2018)**

**Examination pattern for Semester  
III Semester III:**

- a) **Theory Paper:** 100 marks for each paper (Total theory papers 3)
- i) **Internal examination:** Total marks 40 (in each theory paper)
- ii) **External examination:** Total marks 60 (in each theory paper) Duration: 2 <sup>1/2</sup> Hours
- 1) Total number of questions to be framed for theory paper in external examination is 6 of 15 marks each.
- 2) Out of total 6 questions, students are required to attempt **any four** questions.
- b) **Practical Paper:** 100 marks for each paper (Total 2 practical)
- 1) Out of total 100 marks in each practical, 80 marks for practical examination, 10 marks for journal writing and 10 marks for viva.
- 2) No of questions would correspond with number of major modules in the respective practical Course syllabus.
- c) **Marking system:**
- i) Total marks for theory: 300 ( 6 Credits \*3 theory papers =18 credits)
- ii) Total marks for practical: 200 ( 6 credits \*2 practical = 12 credits)
- iii) **Grand Total for Semester III= 500 marks : 30 credits**



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# UNIVERSITY OF MUMBAI



**Revised Syllabus for the M.A. & M.Sc.**

**Program: M.A. & M.Sc.**

**Course: Geography**

**(Semester IV)**

(As per Choice based Credit System with effect from the academic year 2017-2018)

**Choice Based Credit System Syllabus, 2017-18**

Total No. of Credits offered: 100

Electives offered in a particular academic year in each group could vary.

Semester is 15 weeks duration. Credits are defined for a semester



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**MALAD (W), MUMBAI - 400 064**



**Paper 401 A 8- Geo-informatics and Health  
Care**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

1. To recognize the relationship between healthcare and Geoinformatics
2. To explain the importance of healthcare database for Geoinformatics
3. To apply the GIS technologies for healthcare
4. To analyze spatial and non-spatial data for health care
5. To develop a model for storing spatial data related to healthcare
6. To assess the healthcare models in GIS

**Course Outcome:**

1. **CO 1:** Learners will be able to recognize the relationship between healthcare and Geoinformatics (Level :Knowledge)
2. **CO 2:** Learners will be able to illustrate the importance of healthcare database for Geoinformatics (Level : Comprehension)
3. **CO 3:** Learners will be able to apply the GIS technologies for healthcare (Level : Application)
4. **CO 4:** Learners will be able to compute spatial and non-spatial data for health care (Level : Application)
5. **CO 5:** Learners will be able to develop a model for storing spatial data related to healthcare (Level : Synthesis)
6. **CO 6:** Learners will be able to assess the healthcare models in GIS- the plume model and the star model (Level : Evaluation)

**Detailed Syllabus**

**1. Health care and Geoinformatics**

**(Contact Hours 15)**

- 1.1 Insight and scope of healthcare in Geoinformatics environment
- 1.2 Health care planning and Geo-Information, Global health policy
- 1.3 Spatial and non-spatial factors
- 1.4 Role of GIS and Remote Sensing for health care planners

**2. Geoinformatics and database for health care**

**(Contact Hours 15)**

- 2.1 GIS data base for diseases- : spatial and non-spatial
- 2.2 Remote Sensing as a source for health related information
- 2.3 Vector and raster data for health care , techniques for analysis
- 2.4 GIS model for healthcare accessibility plume model , star model

**3. GIS, healthcare technologies and surveillance**

**(Contact Hours 15)**

- 3.1 Public health and geo-information system
- 3.2. Health care and GIS and GPS
- 3.3 Socio-demographic determinants and GIS initiatives
- 3.4. GIS and spatial Epidemiology

**4. GIS applications for health care (Employability)**

**(Contact Hours 15)**

- 4.1. GIS and environmental risk factor analysis
- 4.2. Spatio-temporal approach and spatial statistics for creation of habitat suitability
- 4.3 Geoinformatics as a decision support system for prevention of epidemic disease
- 4.4. Web-based GIS for control of communicable diseases



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MALAD (W), MUMBAI - 400 064

**Paper 401 A 8- Geo-informatics and Health  
Care**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

1. To recognize the relationship between healthcare and Geoinformatics
2. To explain the importance of healthcare database for Geoinformatics
3. To apply the GIS technologies for healthcare
4. To analyze spatial and non-spatial data for health care
5. To develop a model for storing spatial data related to healthcare
6. To assess the healthcare models in GIS

**Course Outcome:**

1. **CO 1:** Learners will be able to recognize the relationship between healthcare and Geoinformatics (Level :Knowledge)
2. **CO 2:** Learners will be able to illustrate the importance of healthcare database for Geoinformatics (Level : Comprehension)
3. **CO 3:** Learners will be able to apply the GIS technologies for healthcare (Level : Application)
4. **CO 4:** Learners will be able to compute spatial and non-spatial data for health care (Level : Application)
5. **CO 5:** Learners will be able to develop a model for storing spatial data related to healthcare (Level : Synthesis)
6. **CO 6:** Learners will be able to assess the healthcare models in GIS- the plume model and the star model (Level : Evaluation)

**Detailed Syllabus**

**1. Health care and Geoinformatics**

**(Contact Hours 15)**

- 1.1 Insight and scope of healthcare in Geoinformatics environment
- 1.2 Health care planning and Geo-Information, Global health policy
- 1.3 Spatial and non-spatial factors
- 1.4 Role of GIS and Remote Sensing for health care planners

**2. Geoinformatics and database for health care**

**(Contact Hours 15)**

- 2.1 GIS data base for diseases- : spatial and non-spatial
- 2.2 Remote Sensing as a source for health related information
- 2.3 Vector and raster data for health care , techniques for analysis
- 2.4 GIS model for healthcare accessibility plume model , star model

**3. GIS, healthcare technologies and surveillance**

**(Contact Hours 15)**

- 3.1 Public health and geo-information system
- 3.2. Health care and GIS and GPS
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- 3.4. GIS and spatial Epidemiology

**4. GIS applications for health care (Employability)**

**(Contact Hours 15)**

- 4.1. GIS and environmental risk factor analysis
- 4.2. Spatio-temporal approach and spatial statistics for creation of habitat suitability
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- 6.Masser, Ian (1998): Government and Geographical Information Systems, Taylor & Francis Group, London.
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(AUTONOMOUS)  
MALAD (W), MUMBAI - 400 064**

**Paper: 402 B-7 Ecology and Environment**

**No. of Credits: 6 Teaching Hours 60 + Notional Hours 60= Total hours 120**

**Course Objectives:**

7. To recognize the basic concepts of ecology
8. To interpret environmental degradation
9. To discover methods of environmental conservation and sustainability
10. To estimate environmental problems through research
11. To compare between various environmental issues
12. To justify the environmental problems obtained in the research

**Course Outcome:**

1. **CO 1:** Learners will be able to recognize the basic concepts of ecology like ecosystem, energy flow, food chain and major ecosystems (**Level : Knowledge**)
2. **CO 2:** Learners will be able to interpret environmental degradation (**Level : Comprehension**)
3. **CO 3:** Learners will be able to discover methods of environmental conservation and sustainability (**Level : Application**)
4. **CO 4:** Learners will be able to estimate environmental problems through research like in the case of Mumbai Metropolitan Region (**Level : Analysis**)
5. **CO 5:** Learners will be able to compare between various environmental issues (**Level : Synthesis**)
6. **CO 6:** Learners will be able to justify the environmental problems obtained in the research (**Level : Evaluation**)

**Detailed Syllabus**

**1. Ecology: Concepts and Applications**

**(Contact Hours 15)**

- 1.1. Introduction to ecology: overview
- 1.2 Nutrient Cycling: Phosphorus, Nitrogen and carbon.
- 1.3 Energy Energy flows tropic levels-energy pyramids.
- 1.4 Life on land and water: Importance of Solar energy and Ocean water- Terrestrial and aquatic ecosystem of tropical/temperate/polar/ hot desert tropical/temperate/polar ocean/ lakes and ponds ( any one from land and water each)

**2 Environmental degradation**

**(Contact Hours 15)**

- 2.1. Factors responsible and consequences nature induced (one example from each related to tectonic / atmospheric/ oceanic)
- 2.2. Factors responsible and consequences - human induced primary/secondary/tertiary activities (any one example from each activity)
- 2.3. Global environmental problems.
- 2.4. Local environmental problems with special reference to Mumbai Metropolitan Region

**3 Environmental Conservation and Sustainability**

**(Contact Hours 15)**

- 3.1. Need ecological equilibrium- stability- environmental sustainability
- 3.2. Principles of Environmental conservation
- 3.3. Global efforts for Environmental conservation
- 3.4. Role of Indian government towards Environmental conservation

**4. Environmental Research:(Employability)**

**(Contact Hours 15)**

- 4.1. Concept, objectives and scope.
- 4.2. Review of literature and research methodology
- 4.3. Study area: Focus on any one major environmental problem of area selected.
- 4.4. Findings, limitations, suggestions.

**References:**



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2. Basu, D. (ed.) (1995): Environment and Ecology - The Global Challenge, Printwell, Jaipur.
3. Calvert P.S. (1999): The South, the North, and the Environment, Printer, London and New York.
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6. Mather, A.S. and Chapman, K. (1995): Environmental Resources, Longman group Limited, U.K.
7. Molles (2013): Ecology - Concepts and applications , McGraw Hill Publications, 6<sup>th</sup> edition.
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University of Mumbai  
M.A./ M.Sc. Geography Syllabus Based on Choice Based Credit System (CBCS)  
W.e.f. Academic Year 2017-2018  
Semester IV

Paper: 403 Group 3 Practical Based Dissertation Credit 10

(Data -based study on any branch of Geography)



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Annexure I

Department of Geography

University of Mumbai

Two Year Degree Course of M. A./M.Sc. in Geography

As per Choice Based Credit System  
(CBCS) (With effect from the academic year  
2017-2018)

Examination pattern for Semester IV

Semester IV:

- a) **Theory Paper:** 100 marks for each paper (Total theory papers 2)
- i) **Internal examination:** Total marks 40 (in each theory paper)
- ii) **External examination:** Total marks 60 (in each theory paper) Duration: 2 <sup>1</sup>/<sub>2</sub> Hours
- 1) Total number of questions to be framed for theory paper in external examination is 6 of 15 marks each.
- 2) Out of total 6 questions, students are required to attempt **any four** questions.
- b) **Dissertation:** 100 marks
- 1) Out of total 100 marks 20 marks for internal assessment and 80 marks by external examiner i.e. 60 marks for assessment and 20 marks for viva voce examination on dissertation.
- c) **Marking system:**
- 1) Total marks for theory: 200 ( 6 Credits \*2 theory papers =12 credits)
- 2) Total marks for practical: 100 (10 credits\* 1 dissertation = 10 credits)
- 3) **Grand Total for Semester IV= 300 marks : 22 credits**



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