

Shivaji University, Kolhapur
Department of Geography
(Faculty of Science and Technology)



Revised Syllabus of
M.A./M.Sc. Geography
(Choice Based Credit System)

Implemented From...

Academic Year 2019-20 onwards
(i.e., from June 2019)

Phone: +91-0231-2609194
Fax: +91-0231-2691533

Email: geography@unishivaji.ac.in
Web: <http://www.unishivaji.ac.in/dptgoe/>

M.A./M.Sc. Geography Programme Structure (CBCS PATTERN) (2019-20 onwards) M.A./M.Sc. Part – I

SEMESTER-I (Duration- Six Month)											
	Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
			Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
			Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
CGPA	1	CC-101	4	4	4	80	32	3	20	8	1
	2	CC-102	4	4	4	80	32	3	20	8	1
	3	CC-103	4	4	4	80	32	3	20	8	1
	4	CC-104	4	4	4	80	32	3	20	8	1
	5	CCPr-105	16	16	8	200	80	*	--	--	--
Total (A)			--	--	24	520	--	--	80	--	--
Non-CGPA	1	AEC-106	2	2	2	--	--	--	50	20	2
SEMESTER-II (Duration- Six Month)											
CGPA	1	CC-201	4	4	4	80	32	3	20	8	1
	2	CC-202	4	4	4	80	32	3	20	8	1
	3	CCS-203	4	4	4	80	32	3	20	8	1
	4	CCS-204	4	4	4	80	32	3	20	8	1
	5	CCPr-205	16	16	8	200	80	*	--	--	--
Total (B)			--	--	24	520	--	--	80	--	--
Non-CGPA	1	SEC-206	2	2	2	--	--	--	50	20	2
Total (A+B)					48	1040	--	--	160	--	--

M.A./M.Sc. Geography Programme Structure (CBCS PATTERN) (2020-21 onwards) M.A./M.Sc. Part – II

SEMESTER-III (Duration- Six Month)											
	Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
			Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
			Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
CGPA	1	CC-301	4	4	4	80	32	3	20	8	1
	2	CCS-302	4	4	4	80	32	3	20	8	1
	3	DSE-303	4	4	4	80	32	3	20	8	1
	4	DSE-304	4	4	4	80	32	3	20	8	1
	5	CCPr -305	16	16	8	200	80	*	--	--	--
Total (C)			--	--	24	520	--	--	80	--	--
Non-CGPA	1	AEC-306	2	2	2	--	--	--	50	20	2
	2	EC (SWM MOOC)-307	Number of lectures and credit shall be as specified on SWAYAM MOOC								
SEMESTER-IV (Duration- Six Month)											
CGPA	1	CC-401	4	4	4	80	32	3	20	8	1
	2	CCS-402	4	4	4	80	32	3	20	8	1
	3	DSE-403	4	4	4	80	32	3	20	8	1
	4	DSE-404	4	4	4	80	32	3	20	8	1
	5	CCPr-405	16	16	8	200	80	*	--	--	--
Total (D)			--	--	24	520	--	--	80	--	--
Non-CGPA	1	SEC-406	2	2	2	--	--	--	50	20	2
	2	GE-407	2	2	2	--	--	--	50	20	2
Total (C+D)					48	1040	--	--	160	--	--

Note(s):

•Student contact hours per week : 32 Hours (Min.)	•Total Marks for M.A./M.Sc.-I : 1200 •Total Marks for M.A./M.Sc.-II : 1200
•Theory and Practical Lectures : 60 Minutes Each	•Total Credits for M.A./M.Sc.-I (Semester I & II) : 48 •Total Credits for M.A./M.Sc.-II (Semester III & IV): 48
•CC- Core Course •CCS- Core Course Specialization •CCPr- Core Course Practical •DSE- Discipline Specific Elective •AEC- Mandatory Non-CGPA compulsory Ability Enhancement Course •SEC- Mandatory Non-CGPA compulsory Skill Enhancement Course •EC (SWM MOOC) - Non-CGPA Elective Course •GE- Generic Elective	•Practical Examination is annual •Practical courses are divided into 2 or 3 sections •*Duration of practical examination as per respective BOS guidelines • Separate passing is mandatory for Theory, Internal and Practical examination

	M.A./M.Sc.-I	M.A./M.Sc.-II	Total
Marks	1200	1200	2400
Credits	48	48	96

I. CGPA course:

1. There shall be 14 Core Courses (CC) per programme.
2. There shall be 04 Core Course Specialization (CCS) of 16 credits per programme.
3. There shall be 02 Discipline Specific Elective (DSE) courses of 08 credits per programme.
4. Total credits for CGPA courses shall be of 96 credits per programme.

II. Mandatory Non-CGPA Courses:

1. There shall be 02 Mandatory Non-CGPA compulsory Ability Enhancement Courses (AEC) of 02 credits each per programme.
2. There shall be 02 Mandatory Non-CGPA compulsory Skill Enhancement Course (SEC) of 02 credits per programme.
3. There shall be one Elective Course (EC) (SWAYAM MOOC). The credits of this course shall be as specified on SWAYAM MOOC.
4. There shall be one Generic Elective (GE) course of 02 credits per programme. Each student has to take generic elective from the department other than parent department.
5. The total credits for Non-CGPA course shall be of 10 credits + 2-4 credits of EC as per availability.
6. The credits assigned to the course and the programme are to be earned by the students and shall not have any relevance with the work load of the teacher.

Programme and Course Guidelines (for CGPA Courses):

1. **Title of the Course:** M.A./M.Sc. in Geography
2. **Year of Implementation:** Revised syllabus will be implemented from academic year 2019-20.
3. **Programme Duration:** The M.A./M.Sc programme duration is of two years comprising of four semesters. Each semester spanning for 6 months of minimum 120 working days (minimum 90 teaching days).
4. **Scheme of Examination:**

Paper Type	*Internal Marks	University Assessment	Total Marks	Credit per Course	No. of Course	Total Credits
Theory	20	80	100	04	16	64
Practical / Project	--	200	200	08	04	32

*Note: Internal marks for each theory course - 20 marks (Class Test: 10 marks; Assignment/Seminar: 10 marks)

5. Course Structure (CBCS):

Paper No.	Course Title	Teaching hours per week	Credits
<i>M.A./M.Sc. Geography Sem. I</i>			
CC-101	Fundamentals of Geomorphology	4	4
CC-102	Principles of Climatology	4	4
CC-103	Economic Geography	4	4
CC-104	Geography of Population and Human Resource Development	4	4
CCPr-105 (Annual)	105.1 Practicals in Geomorphology and Surveying	16	8
	105.2 Analysis of Climatic Data		
	105.3 Analysis of Socio-economic Data		
CGPA - Total Credit (Cumulative)			24 (24)
AEC-106	Ability Enhancement Course	--	2
Non-CGPA - Total Credit (Cumulative)			02 (02)
<i>M.A./M.Sc. Geography Sem. II</i>			
CC-201	Applied Geomorphology	4	4
CC-202	Applied Climatology and Climate Change	4	4
CCS-203	Advanced Cartography and Surveying	4	4
CCS-204	Social and Cultural Geography	4	4
CCPr-205 (Annual)	205.1 Computer Applications in Geography	16	8
	205.2 Statistical Techniques in Geography		
	205.3 Quantitative Techniques in Geography		
CGPA - Total Credit (Cumulative)			24 (48)
SEC-206	Skill Enhancement Course	--	2
Non-CGPA - Total Credit (Cumulative)			02 (04)
<i>M.A./M.Sc. Geography Sem. III</i>			
CC-301	Geohydrology and Oceanography	4	4
CCS-302	Fundamentals of Remote Sensing and Digital Image Processing	4	4
DSE-303 (Optional)	Geography of Environment OR Biogeography	4	4
DSE-304 (Optional)	Settlement Geography OR Geography of India OR Political Geography	4	4
CCPr-305 (Annual)	305.1 Research Methodology and Geographical Excursion - 2 Credits	16	8
	305.2 Dissertation/ Project – 6 Credits		
CGPA - Total Credit (Cumulative)			24 (72)
AEC-306	Ability Enhancement Course	--	2
EC-307	Elective Course (SWAYAM MOOC)	--	2/4
Non-CGPA - Total Credit (Cumulative)			4/6 (8/10)
<i>M.A./M.Sc. Geography Sem. IV</i>			
CC-401	Development of Modern Geographical Thought	4	4
CCS-402	Regional Planning and Development	4	4
DSE-403 (Optional)	Fundamentals of GIS and Introduction to GPS OR Fundamentals of Soil Geography	4	4
DSE-404 (Optional)	Agricultural Geography OR Tourism Geography OR Geography of Health	4	4
CCPr-405 (Annual)	405.1 Photogrammetry and Remote Sensing – 4 Credits	16	8
	405.2 Introduction to DIP and GIS Software (Optional) OR		
	405.2 Soil and Water Analysis (Optional) – 4 Credits		
CGPA - Total Credit (Cumulative)			24 (96)
SEC-406	Skill Enhancement Course	--	2
GE-407	Generic Elective Course	--	2
Non-CGPA - Total Credit (Cumulative)			4 (12/14)

6. Nature of Question Paper in University Assessment

I. Nature of Theory Question Paper:

Question No.	Type of Question	Number of Questions to be Asked	Number of Questions to be Answered	Marks per Question	Total Marks
Q1.	Objective type (MCQ)	08	08	02	16
Q2.	Short Answer (Definition type)	04	04	04	16
Q3.	Short Notes (Descriptive type)	03	02	08	16
Q4.	Long Answer/ Essay type	02	01	16	16
Q5.	Long Answer/ Essay type	02	01	16	16
Total = 05	--	--	--	--	80

II. Nature of Practical Question Paper for Course No. 105 and 205:

Question No.	Type of Question/ Assessment	No. of Questions	Total Marks/ Course
Section 1: Q1 and Q2	Practical/ Lab Assessment	02	50
Section 2: Q3 and Q4	Practical/ Lab Assessment	02	50
Section 3: Q5 and Q6	Practical/ Lab Assessment	02	50
Q7.	Practical Assignment (External)	01	25
Q.8.	Viva-voce (External)	01	25
Total = 08	--	--	200

III. Nature of Practical Question Paper for Course No. 305:

Question No.	Type of Question/ Assessment	No. of Questions	Total Marks
Section 1: Q1 and Q2	Practical/ Lab Assessment based on Research Methodology	02	30
Section 2: Q3 and Q4	Practical/ Lab Assessment based on Dissertation/ Project	02	50
Q5.	Practical Assignment based on Research Methodology and Geographical Excursion (External)	01	10
Q6.	Viva-voce based on Research Methodology and Geographical Excursion (External)	01	10
Q7.	Dissertation/ Project Report Evaluation (External)	01	50
Q.8.	Viva-voce based on Dissertation/ Project Report (External)	01	50
Total = 08	--	--	200

IV. Nature of Practical Question Paper for Course No. 405:

Question No.	Type of Question/ Assessment	No. of Questions	Total Marks
Section 1: Q1 to Q3	Practical/Lab Assessment	03	75
Section 2: Q4 to Q6 OR Section 3: Q4 to Q6	Practical/Lab Assessment	03	75
Q7.	Practical Assignment (External)	01	25
Q8.	Viva-voce (External)	01	25
Total = 08	--	--	200

7. Equivalence in Accordance with Title and Content of Courses (for revised syllabus):

Sr. No.	Title of Old Course	Title of New Course
1.	GCT-101: Fundamentals of Geomorphology	CC-101: Fundamentals of Geomorphology
2.	GCT-102: Principles of Climatology	CC-102: Principles of Climatology
3.	GCT-103: Economic Geography	CC-103: Economic Geography
4.	GCT-104: Geography of Population and Human Resource Development	CC-104: Geography of Population and Human Resource Development
5.	GCT-205: Applied Geomorphology	CC-201: Applied Geomorphology
6.	GCT-206: Applied Climatology and Climate Change	CC-202: Applied Climatology and Climate Change
7.	GCT-308: Advance Cartography and Surveying (Sem. III)	CCS-203: Advanced Cartography and Surveying
8.	GOT-201: Social and Cultural Geography	CCS-204: Social and Cultural Geography
--	GOT-202: Geography of India	DSE-304(b): Geography of India (Sem. III)
--	GOT-203: Political Geography	DSE-304(c): Political Geography (Sem. III)
--	GOT-204: Geography of Health	DSE-404(c): Geography of Health (Sem. IV)
9.	GCT-101: Practical in Geomorphology and Field Survey	CCPr-105: 105.1 Practicals in Geomorphology and Surveying
10.	GCP-102: Analysis of Socio-economic and Climatic Data	105.2 Analysis of Climatic Data 105.3 Analysis of Socio-economic Data
11.	GCP-203: Computer Application in Geography	CCPr-205: 205.1 Computer Applications in Geography
12.	GCP-204: Statistical Techniques in Geography	205.2 Statistical Techniques in Geography 205.3 Quantitative Techniques in Geography

8. Program Educational Objectives (PEOs):

1. To enhance students' ability to apply their specialized knowledge in the geographical domain.
2. To develop employability skills and competencies to serve the job requirements in the society.
3. Inspire students to develop the abilities among them to offer services in the entrepreneurial environment.
4. To cultivate the interest among students to conduct research activities in the discipline of Geography.

9. Programme Outcomes (POs):

1. Students will have comprehensive knowledge in the discipline of Geography.
2. They will have ability of making comprehensive analysis, interpret spatial problems, and suggest proper solutions by using theoretical, methodological, and instrumental knowledge of Geography.
3. Good employability skills as per current need of the society to compete in the competitive world.
4. They will have good understanding about proper utilization of natural resources through geographical knowledge.
5. Aware about the regional and national environmental issues, recent trends, and technological advancements in the discipline of Geography.
6. Develop research interest to solve critical and emerging issues related to geography and the surrounding environment.

CC-101: Fundamentals of Geomorphology

Course Outcomes (COs):

1. To understand the development of geomorphic thought throughout the time with a review of fundamental concepts of geomorphology.
2. To look into the evolution of continents and ocean basins with continental drift theory.
3. To know the endogenetic and exogenetic forces controlling landform development with special reference to the denudational processes.
4. To see the mountain building activities through different theories.

Unit: 1

15 Lectures

Meaning nature and scope of geomorphology, Development of geomorphic thought, a brief review of fundamental concepts of geomorphology: Principle of Uniformitarianism.

Unit: 2

15 Lectures

Evolution of Continents and ocean basins: Continental drift theory of Taylor, Continental Drift theory of Wegener, Theory of Plate Tectonics.

Unit: 3

15 Lectures

Factors controlling landform development: Endogenetic and Exogenetic forces, Denudational processes, Weathering, Erosion and Mass wasting.

Unit: 4

15 Lectures

Mountain building activities, Geosynclinal theory of Kober, Holms Convective current theory, Theory of Isostasy.

References:

1. Allaby, Michael (2008): Oxford Dictionary of Earth Science, Oxford University Press, New York.
2. Bloom, A.L. (1991): Geomorphology, 2nd Ed Englewood Cliffs, M.J. Prentice Hall.
3. Chorley, R.J. Schumm, S.A. & Sugden, D.E. (1985): Geomorphology, Methuen & Co. Ltd., London, New York.
4. Brierley, G.J. & Fryirs, K.A. (2005): Geomorphology and River Management, Blackwell Publishing, Oxford UK.
5. Briggs, K. (1985): Physical Geography Process and System, Hodder and Stoughton, London.
6. Christopherson, R.W. (1995): Elemental Geosystems: A Foundation in Physical Geography, Prentice Hall Englewood Cliffs, New Jersey.
7. Cook, R.U. & Doornkamp, J.C. (1974): Geomorphology in Environmental Management, an Introduction. Clarendon Press. Oxford.
8. Dayal, P. (1996): A Textbook of Geomorphology, Shukla Book Depot, Patna.
9. Fairbridge, R.W., ed. (1968): Encyclopaedia of Geomorphology Reinhold, New York.
10. Hart, M.G. (1986): Geomorphology Pure and Applied, George Allen and Unwin, London.
11. Leopold, L.B. Wolman, M.G. & Miller, J.P. (1964): Fluvial Processes in Geomorphology, W.H. Freeman, San Francisco.
12. Lobeck, A.K. (1939): Geomorphology, McGraw Hill, New York.
13. Moor, W.G. (1949): A Dictionary of Geography, Penguin Books, England.
14. Morgan, R.S. & Wooldridge S.W. (1959): Outline of Geomorphology the Physical basis of Geography, Longmans Green, London.
15. Robinson, Harry (1969): Morphology and Landscape, University Tutorial Press Ltd. London.
16. Singh, Savindra (1998): Geomorphology, Prayag Pustak Bhavan, Allahabad.
17. Singh, Savindra (1991): Environmental Geography, Prayag Pustak Bhavan, Allahabad.
18. Spark, B. W. (1986): Geomorphology, Longman, London.
19. Strahler, A.N (1969): Physical Geography. John Wiley & Sons Inc., New York.
20. Thomas, M.F. (1974): Tropical Geomorphology, Macmillan, London.
21. Thornbury, W.D. (1969): Principles of Geomorphology, Wiley Eastern Ltd. New Delhi.
22. Wadia, D.N. (1993): Geology of India, Tata McGraw Hill Edition, New Delhi.
23. Worcester, P. G. (1948): Textbook of Geomorphology, Princeton, D. Van, Norstrand.

CC-102: Principles of Climatology

Course Outcomes (COs):

1. To distinguish the weather and climate with an understanding of structure and composition of Atmosphere;
2. To understand the variations of weather systems in terms of Stability and Instability of atmosphere;
3. To enable the students to understand the vertical and horizontal distribution of atmospheric air;
4. To get complete information about Atmospheric Disturbances in terms of cyclones and anti-cyclones;
5. To know the significance of synoptic Climatology in pollution studies and navigation;

Unit - 1:

15 Lectures

Introduction to Climatology: Significance of Climatology, Development of Modern Climatology, Origin of Atmosphere, Structure and Composition of Atmosphere, Insolation, Heat transfer- Radiation, Convection and conduction, terrestrial heat balance.

Unit - 2:

15 Lectures

Moisture in the Atmosphere: Changes of state, Humidity, Humidity measurements, Stability and Instability of atmosphere, Condensation- Clouds and fogs, Precipitation - precipitation processes, types and forms.

Unit - 3:

12 Lectures

Motion in the Atmosphere: Air Pressure, Pressure measurement and distribution, Factors affecting wind, Pressure belts & Planetary winds, Monsoon and Local winds.

Unit - 4:

18 Lectures

Air Masses and Atmospheric Disturbances: Classification and modifications of Air Masses, Fronts: characteristics and types, Tropical Cyclones, Anticyclones, Thunderstorms, Tornadoes, Hurricanes, Water spouts; Application of Synoptic Climatology in pollution studies and navigation.

References:

Books & Reports:

1. **Aguado, E.**, and Burt, J.E. (2013): *Understanding Weather and Climate*, Pearson, New York, 552pp.
2. **Barry, R.G.**, and Chorley, R.J. (2010): *Atmosphere, Weather and Climate*, Routledge, London, 516pp.
3. **Byers R.H.** (1974): *General Meteorology*, McGraw Hill BKCo New York.
4. **Critchfield, H.J.** (2009): *General Climatology*; Prentice Hall, London.
5. **Das P. K.** (1995): *The Monsoon*, Prayag pustak Bhavan, Allahabad, National Book Trust, India.
6. **Ela Dean**, (2017); **Principles of Atmospheric Science**, Larsen and Keller Education, 249 pp.
7. **Hobbs, J.E.** (1980): *Applied Climatology*, Butterworth, London.
8. **Lal, D.S.**: *Climatology*. Prayag pustak Bhavan, Allahabad.
9. **Lutgens, F.K.**, and Tarbuck, E.J. (2013): *The Atmosphere – An Introduction to Meteorology*. Prentice Hall, Boston, 506pp.
10. **Mather J. R.** (1975): *Climatology : Fundamentals & Applications*. Mc Graw Hills Book Co., New York.
11. **Miller A., et, al.** (1983); *Elements of Meteorology*, Merrill, Columbus.
12. **Oliver J. E.** (1973): *Climate & Mans Environment*, John Wiley & Sons; New york.
13. **Robert V. Rohli, Anthony J. Vega**, (2017): *Climatology*, Jones & Bartlett Learning; 4 edition, 418 pp.
14. **Savindra Singh**, (2006): *Climatology*, Prayag Pustak Bhavan, Allahabad.
15. **Trewartha G.T.** (1968): *An Introduction to climate*, McGraw Hill BK Co. New York.
16. **Williams Sellers**, (2014): **Physical Climatology**, New India Publishing Agency, 280 pp.

Journals:

Bulletin of the American Meteorological Society (<https://journals.ametsoc.org/toc/bams/current>)

Climate Dynamics (<https://link.springer.com/journal/volumesAndIssues/382>)

International journal of Climatology (<https://rmets.onlinelibrary.wiley.com/journal/10970088>)

Journal of Climate (<https://journals.ametsoc.org/toc/clim/current>)

Nature Climate Change (<https://www.nature.com/nclimate/>)

Weather and Climate Extremes (<https://www.sciencedirect.com/journal/weather-and-climate-extremes>)

CC-103: Economic Geography

Course Outcomes (COs):

1. To understand the concepts and basis of economic processes
2. To get acquainted with theories and models in economic geography
3. To get comprehensive knowledge of World energy resources, situation and distribution
4. To know about the Nature, scope and Principles of Industrial Geography
5. To understand transport and Trade policies of country
6. To get detail knowledge of economic power determinants of country and able to analyze the economic development of country.

Unit-1: Basics of Economic Geography

15 Lectures

Nature and scope; Approaches to the study of economic geography; Basis of economic processes: Production, exchange & consumption, Classification and characteristics of economic activities. World economic development: measurement and problems; Special Economic Zones.

Unit-2: Energy Resources

10 Lectures

Concept of resources, Classification of resources, Renewable & Non-renewable energy resources, World energy situation and distribution; Sources of Energy: Coal, Oil, Natural gas and Nuclear energy, OPEC-energy crisis.

Unit- 3: Industrial Geography

15 Lectures

Nature and scope of Industrial Geography, Factors of Industrial Location, Principles of Industrial Location: – Profit maximization, Least cost location- A. Weber & A. Losch- industrial location theories, Rostow's model, Industrial regionalization; World industries: locational patterns and problems; New industrial policies of India.

Unit-4: Transportation & Trade

20 Lectures

Modes of transportation, Accessibility and connectivity; Interregional and Intraregional: Ullman's triad- Complementarily- Intervening Opportunity- Transferability, Trade Policy; Export processing zones, International Trade Characteristics, patterns of world trade, Regional Trade blocks EEC, EFTA, & WTO.

References:

1. Alexander J.W. (1976): Economic Geography, Prentice Hall of India. New Delhi.
2. Alexanderson G. (1988): Geography of manufacturing, Prentice Hall of India. New Delhi.
3. Berry, Conkling & Ray (1988): Economic Geography Prentice Hall of India, New Jersey.
4. Hurst Elliott (1986): Geography of Economic Behaviour, Unwin, London.
5. Johnson R.J. & Taylor D.J. (1989): A world in crisis, Basil-Blackwell, Oxford.
6. Losch (1954): Economics of Location, Yale University Press New York.
7. Redcliff, M. (1987): Development & the environmental crisis. Methuen. London.
8. Sinha B.N.(1971): Industrial geography of India
9. Watts H.D. (1987): Industrial Geography, Longman scientific and Technical, New York.
10. Haggett, Peter: Modern Synthesis in Geography.
11. Robinson H & Bamford C. G. (1978): Geography of Transport, Macdonald & Evans USA.
12. Misra R. P.: Regional Planning, concepts, New Delhi.
13. Jones & Darkenwald : Economic geography

CC-104: Geography of Population and Human Resource Development

Course Outcomes (COs): After completing the course, the students will develop an aptitude to:

1. Infer factors influencing population distribution and density;
2. Acquire skill to describe regional patterns of population composition;
3. Compute and explore fertility, mortality and human development levels for micro, meso and macro regions.
4. Analyse the population-resource regions and discover problems arising due to over and under population.
5. Understand and create awareness about provincial aspects of gender equity, social well-being and quality of life.

Unit-1: Concepts

15 Lectures

Meaning, nature, scope and significance of Population Geography; Sources of population data; Factors influencing population distribution and density-global perspective; Population distribution patterns-global perspective with reference to India and States; Population composition and change: India and States - Demographic, Socio-Cultural, Economic, Health.

Unit-2: Population Processes

20 Lectures

Fertility-Measures and Methods of estimation, spatio-temporal variations - India; Mortality-Measures and Methods of estimation, spatio-temporal variations - India; Migration-measures and methods of estimations.

Unit-3: Population Theories

10 Lectures

Theories of population growth: Malthus, Marx, Demographic Transition Model; Migration theories: Ravenstein and Everette Lee; Epidemiological Transition.

Unit-4: Population Development and Policies

15 Lectures

Population as resource, concepts of over, under and optimum population, population and development debate, population as ecosystem, Limits to Growth, Population resource regions, Human development - World, Social well-being and quality of life, Gender Equity; Population Policies-perspectives from developed and developing world, National Population Policy of India.

References:

Books & Reports:

1. **Barrett H.R. (1992):** Population Geography, Oliver and Boyd Longman House, Harlow.
2. **Bhende A., Kanitkar T. (2006):** Principles of Population Studies, Himalaya Publishing House, Bombay. 18th revised.
3. **Birdsell N., Kelley A.C., Sinding S. (2003):** Population Matters: Demographic Change, Economic Growth and Poverty in Developing Countries. Oxford University Press.
4. **Bruce Newbold, K. (2010):** Population Geography: Tools and Issues. Rowman& Littlefield Publishers, Inc., UK.
5. **Clark, J. I. (1972):** Population Geography. Pergamon Press, Oxford.
6. **Crispin J., Jegede J. (2000):** Population, Resource and Development. Harpercollins Education; 2nd edition.
7. **Chandana, R.C. (1984):** Geography of Population, Kalyani Publisher, Ludhiana.
8. **Dyson T. (2010):** Population and Development: Demographic Transition. Zed Books Ltd.; 1st edition.
9. **Ehrlich, P.R. and Ehrlich, A.H. (1996):** Ecoscience: Population, Resources, Environment. 6th edition, W.H. Freeman and Company, San Francisco.
10. **Gould WTS. (2009):** Population and Development: Perspective on Development. Routledge: 1st edition.
11. **Garnier, J.B. (1976):** Geography of Population, Longman Group Ltd., London.
12. **George, J. Demko et.al. (1970):** Population Geography: A Reader, McGraw Hill Book Co. New York.
13. **Hausier, Philip M & Duncan (Eds.) (1959):** The Study of Population, University Press, Chicago.
14. **Davis K. (1951):** Population of India and Pakistan, Princeton University Press, Princeton.

15. **Meadow**, D.H., Meadows D.L., Randers J., and Behrens W.W. III. (1973): The Limits to Growth. I Report of the Club of Rome. The New American Library, New York.
16. **Meadows**, D.H., Meadows, D.L. and Randers, J. (1992): Beyond the Limits. Confronting Global Collapse, Envisioning a Sustainable Future.(A sequel to The Limits to Growth).Chelsea Green Publishers, Post Mills VT, USA.
17. **Newell** C. (1990): Methods and Models in Demography. The Guilford Press; 1st edition.
18. **Pacione** M. (2011): Population Geography: Progress and Prospects. Routledge; Reissue edition.
19. **Peters** G.L., Larkin R.P. (2008): Population Geography: Problems, Concepts and Prospects. 9th edition. Dubuque, IA: Kendall Hunt Publishing.
20. **Preston** S., Heuveline P., Guillot M. (2000): Demography: Measuring and Modelling Population Processes. Wiley-Blackwell; 1st edition.
21. **Rowland** DT. (2003): Demographic Methods and Concepts. Oxford University Press, USA.
22. **Swanson** DA., Siegel JS. (2004): Methods and Materials of Demography. Emerald Group Publishing; 2nd edition.
23. **Smith**, T.L (1960): Fundamental of Population Studies. Lipineott, London.
24. **Srinivasan**, K, and Vlassoff, M. (2001): Population Development Nexus in India: Challenges for the New Millennium. Tata McGraw Hill, New Delhi.
25. **Trewartha**,G.T.(1959): A Geography of Population-World Patterns. John Wiley & Sons Inc. New York.
26. **Todaro** MP, Smith S. (2011): Economic Development. 11th edition Printice Hall.
27. United Nation Development Program (UNDP) (2012): **Human Development Reports** (1990-2012) <http://hdr.undp.org/en/>.
28. **Weeks** JR. (2004): Population: An Introduction to Concepts and Issues. Wadsworth Publishing; 9th edition.
29. **Woods**, R. (1979): Population Analysis in Geography. Longman, London.
30. **Zelinsky**, M. et. al. (1970): Geography and Crowding World, Oxford University Press New York.
31. **Zelinsky**, W (1966): A Prologue of Population Geography, Prentice Hall Inc, M.J.

Journals:

Demography: <https://link.springer.com/journal/13524>

International Migration Review: <https://journals.sagepub.com/home/mrx>

Journal of Population Research: <https://link.springer.com/journal/12546>

Population and Environment: <https://link.springer.com/journal/11111>

Population Bulletin: <https://www.prb.org/population-bulletins/>

Population Development Review: <https://onlinelibrary.wiley.com/loi/17284457>

Population, Space, and Place: <https://onlinelibrary.wiley.com/journal/15448452>

Population Studies: <https://www.tandfonline.com/loi/rpst20>

Studies in Family Planning: <https://onlinelibrary.wiley.com/journal/17284465>

The Professional Geographer: <https://www.tandfonline.com/loi/rtpg20>

Useful Websites:

Census of India: <http://censusindia.gov.in/>

Population Reference Bureau: www.prb.org

Population Division of United Nations: <https://www.un.org/en/development/desa/population/index.asp>

Population Council: <https://www.popcouncil.org/>

The World Bank: www.worldbank.org

United Nations Development Program: <http://hdr.undp.org/en/>

CCPr-105.1: Practicals in Geomorphology and Surveying**Course Outcomes (COs):**

1. To know the methods of representation of relief.
2. Understanding the topographical maps.
3. Identification and mapping of drainage patterns
4. To look into the drainage basin morphometry.
5. To understand the field surveying methods.

Unit-1: Relief Representation and Maps**15 Hrs.****A) Methods of Representation of Relief:**

1. Pictorial
2. Mathematical.

B) Maps:

3. Definition:
4. Types of maps
5. Indexing of Topographical sheets. Identification & Mapping of Landforms from Topographical Maps: Ridge; Saddle; Col.; Pass; Spur; Plateau; Escarpment; Cliff; Waterfall; River Terraces; 'U' shaped Valley; 'V' shaped Valley.

Unit-2: Drainage Basin Analysis**40 Hrs.****A) Identification & Mapping of Drainage Patterns:**

6. Dendritic;
7. Trellis;
8. Radial;
9. Drainage Patterns.

B) Quantitative Analysis of Channel Planform:

10. Sinuosity Index of Straight channel.
11. Sinuosity Index of Sinuous Channel.
12. Sinuosity Index of Meandering channels.

C) Analysis of Cross Profiles & Longitudinal Profile of Rivers:

13. Cross profiles
14. Profile projected
15. Profile superimposed
16. Profile composite

D) Drainage Basin Morphometry:

17. Delineating Drainage Basin Perimeters,
18. Measurement of Drainage basin area,
19. Relief/Height (H),
20. Perimeter Length (P),
21. Strahler Stream Order system,
22. Calculation of Bifurcation Ratio,
23. Calculation of Drainage density,
24. Calculation of Stream Frequency,
25. Drainage Texture,
26. Elongation ratio,
27. Circularity Ratio.

Unit-3: Field Surveying

25 Hrs.

28. Definition and uses of surveying.
29. Classification of surveying.
30. Transit Theodolite: Concept of transiting, swinging, face left, face right and changing face.
31. Measurement of horizontal and vertical angles.
32. Determination of horizontal distance between two inaccessible points with Theodolite.
33. Theodolite Traverse Surveying and Stadia Survey.
34. Tacheometry. Preparation of Contour map of small area.
35. Total Station: Components used in Total Station Surveying;
36. To plot a small area using measurements taken from a Total Station.

References:

1. Davis, Peter, (1974): Science in Geography Data Description & Presentation, Vol.3, Oxford University Press, London.
2. Hanwell, J.D. & Newson, M.D. (1973): Macmillan Education Ltd., London.
3. Mishra, R.P. (1973): Elements of Cartography. Prasaranga, University of Mysore.
4. Monkhouse, F.JR & Wilkinson, H.R: Maps and Diagrams, Mathwn & Company, London.
5. Robinson, A.H & Sale R.D.: Elements of Cartography. Johns House & Sons, London.
6. Sing R. L. (1996): Map Work & Practical Geography, Central Book Dept. Allahabad.
7. Singh & Kanaujia (1973): Map Work & Practical Geography, Central Book Dept. Allahabad.
8. N. N. Basak (1994): Surveying and Leveling, Tata McGraw Hill Publishing Company LTD., New Delhi.
9. B.C. Punmia, 2016, *Surveying Volume 1, 2, 3– 16th Edition*, Laxmi Pulications (P) Ltd.
10. Kulkarni, S.V. and Kanetkar, T.R. (1965): Surveying and Levelling (Volumes I & II), A.V.G. Prakashan, New Delhi
11. King, C. A. M. (1966): Techniques in Geomorphology, Edward Arnold Ltd., London
12. Strahler, A. N. (1964): Quantitative Geomorphology of Drainage Basins and Channel Networks, In: Handbook of Applied Hydrology, Ven Te Chow, Ed., Section 4-II, McGrawHill Book Company, New York.
13. Leopold, L. B., Wolman, M. G. and Miller, J. P. (1964): Fluvial Processes in Geomorphology, W. H. Freeman, San Francisco
14. Singh, S. (1998): Geomorphology, Prayag Pustak Bhawan, Allahabad.
15. Goudie, A. (1990): Geomorphological Techniques, Routledge, London

CCPr-105.2: Analysis of Climatic Data**Course Outcomes (COs):**

1. To identify various sources of climate data
2. To understand the formats of Indian daily weather report and reading of weather signs and symbols
3. To represent meteorological elements diagrammatically and interpretation of results.
4. To know methods of measurement of meteorological elements
5. To analyse interrelationship between various meteorological elements
6. To analyse present and future trends of meteorological elements.

Unit-1: Basics of Climatic Data Analysis**20 Hrs.****Practical Exercise(s):**

- 1-2: Nature and sources of climatic data
- 3: Measurement of meteorological elements- Temperature, Humidity of the air, Precipitation, Wind, Evaporation, Atmospheric pressure
- 4: Indian daily weather report and its format
- 5: Weather details: Weather Signs & symbols
- 6-8: Reading and interpretation of weather maps of representative seasons.

Unit-2: Diagrammatic Depiction of Meteorological Elements**30 Hrs.****Practical Exercise(s):**

- 9-11: Construction and interpretation of Wind Rose Diagrams- Simple, Compound, Octagonal
- 12-14: Interpolation of Isopleth- Isotherms, Isobars, Isohyets
- 15-17: Depiction and Interpretation of Comfort diagrams- Climograph, Hythergraph, Climatograph
- 18-20: Time series analysis- Preparation of trend graphs- Moving averages (three years and five years), Semi-average line

Unit-3: Analysis of Interrelationship: Meteorological Elements**30 Hrs.****Practical Exercise(s):**

- 21-23: Calculation and interpretation of Central tendency of climatic data
- 24-25: Spatial correlation of climatic variables: Graphical analysis
- 26: Water budget: Graphical analysis
- 27: Hydrograph
- 28: Analysis of upper air data- Tephigram (Temperature Height diagram)
- 29: Ergographs (Crop Calendar)
- 30-31: Dispersion graphs: Temperature and rainfall dispersion Diagram

References:

1. Ashish Sarakar: Practical Geography A systematic approach. Orient Longman Limited, Kolkatta.
2. Carbone Greg (2015): Exercises for Weather & Climate (9th Edition) ISBN-10: 0134041364, ISBN-13: 978-0134041360.
3. Critchfield: Principles of Climatology.
4. Dunlop Storm (2014): Meteorology Manual: The Practical Guide to the Weather Hardcover, Haynes Publishing UK; First edition, ISBN-10: 0857332724, ISBN-13: 978-0857332721
5. Lawrence, G.R.P.: Cartographic methods. Mathur co., London
6. Mather J.R. (1974) Climatology, Fundamentals and applications. Mc Graw Hill Book co., New York
7. Monkhouse, F.J.R and: Maps and Diagrams, Wilkinson, H.R. Methuen and Co. London.
8. R.L. Singh & Rana p.B. Singh: Element of Practical Geography. Kalyani Pub. New Delhi (1999).

9. Stacey, F.W. (1919): Practical exercises on the weather and climate of the British Isles and Northwest Europe Hardcover, Publisher: University Press, ASIN: B00089JQMG
10. Trewartha G.T.: An Introduction to climate McGraw – Hill Book Co. New York.
11. Ward DeCourcy R. (2010): Practical Exercises In Elementary Meteorology, Publisher: Cole Press, ISBN-10: 1445532034, ISBN-13: 978-1445532035
12. Wilks D.S.(1965): Statistical Methods in the Atmospheric Sciences, Volume 59: An Introduction (International Geophysics) Series: International Geophysics, Publisher: Academic Press, ISBN-10: 0127519653, ISBN-13: 978-0127519654.

Websites:

- *India Meteorological Department: <http://www.imd.gov.in>*
- *Intergovernmental Panel on Climate Change: <https://www.ipcc.ch/>*
- *NASA-Climate Change and Global Warming: <https://climate.nasa.gov/>*
- *NCDC-NOAA: <https://www.ncdc.noaa.gov/sotc/>*
- *World meteorological organization: <http://worldweather.wmo.int>*
- *India water portal: <https://www.indiawaterportal.org>*

CCPr-105.3: Analysis of Socio-Economic Data**Course Outcomes (COs):**

1. To identify the importance of population studies regarding the fertility, mortality,
2. To understand the socio-economic structure of population
3. To study various statistical methods for analysis of Agricultural activities.
4. To determine the agriculture productivity and analyze results.
5. To get basic understanding of the economic data and its analysis.

Unit-1: Population Data Analysis**40 Hrs.****Practical Exercise(s):**

- 1: Choropleth maps: Mapping of Socio-Economic Phenomena.
- 2: Dot method & its relevance to distribution maps.
- 3: Maps with proportional circles.
- 4: Maps with divided proportional circles.
- 5: Maps with proportional spheres.
- 6-7: Fertility measures- Crude Birth Rate, General Fertility Rate
- 8-9: Mortality measures- Crude Death Rate, Infant Mortality Rate
- 10-11: Literacy measures-Crude Literacy Rate, Gross Enrolment Ratio.
- 12-14: Measures of population Growth- rates, ratios- arithmetic & exponential
- 15-16: Age & Sex Pyramid: Compound and Superimposed pyramid
- 17: Human Development Index

Unit-2: Agricultural Data analysis**20 Hrs.****Practical Exercise(s):**

- 18-19: Calculation of Crop Concentration index: Locational quotient method by Bhatia, Jasbir Singh Method
- 20: Calculation of Crop Diversification index: Bhatia's Method
- 21-22: Identification and interpretation of Crop Combination index by Weaver and Doi methods
- 23: Determination of Agricultural Productivity

Unit-3: Economic Data analysis**20 Hrs.****Practical Exercise(s):**

- 24-25: Trade area delimitation- Breaking Point Theory, Law of Retail Gravitation
- 26: Construction of Flow line charts & maps of transport flows.
- 27-28: Logarithmic & Semi-logarithmic graphs.
- 29: Location Quotient method

References:

1. Lawrence, G.R.P. (1973): Cartographic methods, Methuen & Co. London.
2. Mishra, R.P. (1982): Fundamentals of cartography, Prasaranga, University of Mysore.
3. Monkhouse, F.J.R. & Wilkinson, H.R.: Maps & diagrams, Methuen & company, London.
4. Raisz, Erwin: Principles of cartography, McGraw – hill Book Co., New York.
5. Robinson A.H. & Sale R.D. Element of Cartography, John House & Sons Ltd., London.
6. Singh R. L.: Elements of Practical Geography.
7. Bhende A., Kanitkar, T. (2006): Principles of Population Studies, Himalaya Publishing House, Bombay.
8. Bogue, Donald (1969): Principles of Demography, John Wiley & Sons Inc, New York.
9. Newell C. (1990): Methods and Models in Demography. The Guilford Press.
10. Bruce Newbold, K. (2010): Population Geography: Tools and Issues. Rowman & Littlefield Publishers, UK.
11. Preston S., Heuveline P., Guillot M. (2000): Demography: Measuring and Modeling Population Processes. Wiley-Blackwell.
12. Rowland DT. (2003): Demographic Methods and Concepts. Oxford University Press, USA
13. Swanson DA., Siegel JS. (2004): Methods and Materials of Demography. Emerald Group Publishing.
14. Toyne, Peter; Newby P.T (1971): Techniques in Human Geography, Nelson Thornes Ltd.
15. United Nation Development Program (UNDP) (1990): Human Development Reports (1990-2012).

CC-201: Applied Geomorphology

Course Outcomes (COs):

1. To establish the relationship between the tectonism and geomorphology with the knowledge of interior of the Earth.
2. To verify the impact of dynamic agencies on denudation and their work.
3. To understand the cycle of erosion with different views with special reference to hill slope development.
4. To see the application of geomorphology in the view of anthropogenic and environmental geomorphology.

Unit: 1

15 Lectures

Tectonism and geomorphology, Interior of the Earth, Earthquakes, Volcanoes and associated features, folding and faulting.

Unit: 2

15 Lectures

Dynamic agencies of denudation and their work: Fluvial, Glacial, Coastal, Aeolian and Karst topography, Morphogenetic regions. (15)

Unit: 3

20 Lectures

Cycle of Erosion-Geographical Cycle of Davis, Penck's model of cycle of erosion. Hill Slope development, views of W.M. Davis, Walther Penck, Allen Wood and L.C. King.

Unit: 4

10 Lectures

Applied Geomorphology, Anthropogenic Geomorphology, Environmental Geomorphology and recent trends in Geomorphology.

Reference:

1. Allaby, Michael (2008): Oxford Dictionary of Earth Science, Oxford University Press, New York.
2. Bloom, A.L. (1991): Geomorphology, 2nd Ed Englewood Cliffs, M.J. Prentice Hall.
3. Chorley, R.J. Schumm, S.A. & Sugden, D.E. (1985): Geomorphology, Methuen & Co. Ltd., London, New York.
4. Brierley, G.J. & Fryirs, K.A. (2005): Geomorphology and River Management, Blackwell Publishing, Oxford UK.
5. Briggs, K. (1985): Physical Geography Process and System, Hodder and Stoughton, London.
6. Christopherson, R.W. (1995): Elemental Geosystems: A Foundation in Physical Geography, Prentice Hall Englewood Cliffs, New Jersey.
7. Cook, R.U. & Doornkamp, J.C. (1974): Geomorphology in Environmental Management, an Introduction. Clarendon Press. Oxford.
8. Dayal, P. (1996): A Textbook of Geomorphology, Shukla Book Depot, Patna.
9. Fairbridge, R.W., ed. (1968): Encyclopaedia of Geomorphology Reinhold, New York.
10. Hart, M.G. (1986): Geomorphology Pure and Applied, George Allen and Unwin, London.
11. Leopold, L.B. Wolman, M.G. & Miller, J.P. (1964): Fluvial Processes in Geomorphology, W.H. Freeman, San Francisco.
12. Lobeck, A.K. (1939): Geomorphology, McGraw Hill, New York.
13. Moor, W.G. (1949): A Dictionary of Geography, Penguin Books, England.
14. Morgan, R.S. & Wooldridge S.W. (1959): Outline of Geomorphology the Physical basis of Geography, Longmans Green, London.
15. Robinson, Harry (1969): Morphology and Landscape, University Tutorial Press Ltd. London.
16. Singh, Savindra (1998): Geomorphology, Prayag Pustak Bhavan, Allahabad.
17. Singh, Savindra (1991): Environmental Geography, Prayag Pustak Bhavan, Allahabad.
18. Spark, B. W. (1986): Geomorphology, Longman, London.
19. Strahler, A.N. (1969): Physical Geography. John Wiley & Sons Inc., New York.
20. Thomas, M.F. (1974): Tropical Geomorphology, Macmillan, London.
21. Thornbury, W.D. (1969): Principles of Geomorphology, Wiley Eastern Ltd. New Delhi.
22. Wadia, D.N. (1993): Geology of India, Tata McGraw Hill Edition, New Delhi.
23. Worcester, P. G. (1948): Textbook of Geomorphology, Princeton, D. Van, Norstrand.

CC-202: Applied Climatology and Climate Change

Course Outcomes (COs):

1. To recognize the importance of climate on human life;
2. To identify and categorize climate types and climatic regions of the world;
3. To understand the regional and seasonal variations of weather systems in India;
4. To get comprehensive knowledge about causes and impacts of atmospheric pollution, GHGs emission, ozone layer depletion, acid rain and el-nino;
5. To know about the history, recent trends, impacts and dynamics of climate change on earth;
6. To assess future risks of climate change and the adaptation and mitigation options;

Unit - 1: Impact of Climate and Global Climatic Regions

18 Lectures

History and relevance of applied climatology and climate change studies; Impact of climate on human life, soils, agriculture, and health; Approaches to climatic classification and climatic regions; Climatic classification of Koppen, and Thornthwaite; World pattern of temperature and precipitation.

Unit - 2: Weather Systems of India

10 Lectures

Characteristics of general weather systems of India – spatial and seasonal variation of temperature, humidity, wind and precipitation; Climatic zones of India; Weather forecasting and application of meteorological satellites with special reference to India.

Unit - 3: Atmospheric Pollution and Global Change

10 Lectures

Causes, impacts and society's response to change in air quality and atmospheric pollution; Causes and impacts of greenhouse gas (GHGs) emission, ozone layer depletion, acid rain; El-nino and southern oscillation (ENSO).

Unit - 4: Paleoclimatology and Climate Change

22 Lectures

Paleoclimatology - climate dynamics and water balance with reference to evolution of the earth systems; General overview of the climate change – observed changes and its impacts; Recent trends of climate change and its impact on natural and human subsystems; Significant climate anomalies - notable events of recent times, extreme weather and climate; Future climate changes – risks and impacts with special reference to India; Adaptation and mitigation options of climate change.

References:

Books & Reports:

1. **Aguado, E.**, and Burt, J.E. (2013): *Understanding Weather and Climate*, Pearson, New York, 552pp.
2. **Ahrens, C.D.** (2008): *Essentials of Meteorology – An Invitation to the Atmosphere*, Thomson Learning, Belmont, 485pp.
3. **Ahrens, C.D.**, and Samson, P. (2011): *Extreme Weather and Climate*, Brooks/Cole, Belmont, 508pp.
4. **Barry, R.G.**, and Chorley, R.J. (2010): *Atmosphere, Weather and Climate*, Routledge, London, 516pp.
5. **Christopherson, R.W.** (2012): *Geosystems – An Introduction to Physical Geography*, Prentice Hall, Boston, 623pp.
6. **Dessler, A.E.**, and Parson, E.A. (2009): *The Science and Politics of Global Climate Change – A Guide to the Debate*, Cambridge University Press, Cambridge, 190pp.
7. **Gabler, R.E.**, Peterson, J.F., Trapasso, L.M., and Sack, D. (2009): *Physical Geography*, Brooks/Cole, Belmont, 641pp.
8. **Hobbs, J.E.** (1980): *Applied Climatology – A Study of Atmospheric Resources*, Dawson Publishing/Westview Press, Butterworth-Heinemann, 222pp.
9. **IPCC 5th Assessment report on Climate Change**: <http://www.ipcc.ch/report/ar5/>

10. **Jacobson, M.Z. (2002):** *Atmospheric Pollution – History, Science, and Regulation*, Cambridge University Press, Cambridge, 399pp.
11. **Keller, E.A., and Devecchio, D.E. (2012):** *Natural Hazards*, Prentice Hall, Boston, 554pp.
12. **Khan, M.Z.A., and Gangawala, S. (2011):** *Global Climate Change – Causes and Consequences*, Rawat Publications, Jaipur, 298pp.
13. **Lal, D.S. (2011):** *Climatology*. Sharda pustak Bhavan, Allahabad, 448pp.
14. **Lutgens, F.K., and Tarbuck, E.J. (2013):** *The Atmosphere – An Introduction to Meteorology*. Prentice Hall, Boston, 506pp.
15. **McConnell, D., Steer, D., Knight, C., Owens, K., and Park, L. (2008):** *The Good Earth – Introduction to Earth Science*, McGraw Hill, New York, 536pp.
16. **Monroe, J.S., and Wicander, R. (2009):** *The Changing Earth – Exploring Geology and Evolution*, Brooks/Cole, Belmont, 735pp.
17. **Philander, S.G. (2008):** *Encyclopedia of Global Warming and Climate Change*, Sage, London, 1283pp.
18. **Ruddiman, W.F. (2008):** *Earth's Climate – Past and Future*, W. H. Freeman, New York, 388pp.
19. **Singh, S. (2009):** *Climatology*, Prayag Pustak Bhawan, Allahabad, 504pp.
20. **Stanley, S.M. (2009):** *Earth System History*, W.H. Freeman, New York, 551pp.
21. **Strahler, A. (2011):** *Introducing Physical Geography*, Wiley, New Jersey, 632pp.
22. **World Development Report 2010 – Development and Climate Change**, The World Bank, Washington D.C., 417pp.

Research Journals:

Atmospheric Chemistry and Physics (<https://www.atmospheric-chemistry-and-physics.net/index.html>)
Atmospheric Environment (<https://www.sciencedirect.com/journal/atmospheric-environment>)
Bulletin of the American Meteorological Society (<https://journals.ametsoc.org/toc/bams/current>)
Climatic Change (<https://link.springer.com/journal/volumesAndIssues/10584>)
Climate Dynamics (<https://link.springer.com/journal/volumesAndIssues/382>)
Global Environmental Change (<https://www.sciencedirect.com/journal/global-environmental-change>)
International journal of Climatology (<https://rmets.onlinelibrary.wiley.com/journal/10970088>)
Journal of Climate (<https://journals.ametsoc.org/toc/clim/current>)
Mausam (<http://metnet.imd.gov.in/imdmausam/>)
Nature Climate Change (<https://www.nature.com/nclimate/>)
Nature Geoscience (<https://www.nature.com/ngeo/>)
Weather and Climate Extremes (<https://www.sciencedirect.com/journal/weather-and-climate-extremes>)
WIREs Climate Change (<https://onlinelibrary.wiley.com/journal/17577799>)

Websites:

India Meteorological Department: <http://www.imd.gov.in>
Intergovernmental Panel on Climate Change: <https://www.ipcc.ch/>
NASA-Climate Change and Global Warming: <https://climate.nasa.gov/>
NCDC-NOAA: <https://www.ncdc.noaa.gov/sotc/>
World Meteorological Organization: <https://public.wmo.int/en>

CCS-203: Advanced Cartography and Surveying

Course Outcomes (COs):

1. To understand basic principles of cartography and surveying
2. To explain various cartographic methods and techniques for preparation of maps and diagrams.
3. To compare the difference between manual and digital cartography
4. To acquaint with the skills regarding digital cartography
5. To identify sources and types of errors occurs during surveying
6. To get familiar with the basic aspects of linear, vertical and angular measurements of surveying.

Unit - 1: Fundamentals of Cartography

20 Lectures

Definition, nature and scope of cartography, History of cartography, Basics of geodesy, Basic principles of cartography, Scale- definition, types & importance, Concept of datum- vertical and horizontal, Co-ordinate systems- geographical and projected, Map- definition, types and significance, Cartographic methods and techniques for representation of data.

Unit - 2: Digital Cartography

15 Lectures

Introduction to digital cartography, Manual cartography vs. Digital cartography, Cartographic data and its sources, Cartographic database, Map design, Digital mapping- Thematic maps, Symbolization and visualization, Modern techniques of map production, Digital cartography- hardware and software, Advantages and disadvantages, Applications of digital cartography.

Unit - 3: Fundamentals of Surveying

10 Lectures

Definition, classification and principles of surveying, Character of surveying work- field work and office work, Sources and types of errors, Precision and accuracy, Units of measurements.

Unit - 4: Surveying Measurements

15 Lectures

Linear measurement-types of ranging, Methods- approximate, direct, optical and electronic, Errors and applications, Angular measurement-types of measured angles, Compass, Meridian, Bearings and azimuths, Errors, Corrections and precautions, Vertical measurement-types and methods of leveling, Contouring- definition, characteristics, methods and interpolation.

References:

1. Bailey, T. and Gatrell, A. C. (1995): Interactive Spatial Data Analysis. Longman, Harlow.
2. Dorling, D. and Fairborn, D. (1997): Mapping. Ways of Representing the World. Longman, Harlow.
3. Fraser Taylor, D.R. (1980): The Computer in Contemporary Cartography. John Wiley and Sons, New York.
4. Fraser Taylor, D.R. (ed.) (1983): Graphic Communication and Design in Contemporary Cartography. John Wiley and Sons, New York.
5. Kanetkar, T.P. and Kulkarni, S.V. (1967): Surveying and Levelling, Part II, A.V.G. Prakashan, Poona.
6. Keates, J.S. (1973): Cartographic Design and Production, Longman Group Ltd.
7. Mailing, D.H. (1973): Co-ordinate Systems and Map Projections. George Philip and Sons Ltd.
8. Monkhouse, F.J. and Wilkinson, H. R (1962): Maps and Diagrams, Methuen and Company Ltd. and Company Ltd., London.
9. Nag, P. (ed.) (1984): Census Mapping Survey, Concept Publishing Company, New Delhi.
10. Nair, N. B. (1996): Encyclopedia of Surveying, Mapping and Remote Sensing. Rawat Publications., Jaipur and New Delhi.

11. Raisz, E. (1962): Principles of Cartography. McGraw Hill Books Company, Inc., New York.
12. Misra, R.P. and Ramesh, A. (1999): Fundamentals of Cartography. Concept Publishing Company, New Delhi.
13. Rhind, B. and Adams, T. (ed.) (1983): Computers in Cartography. British Cartographic Society, London.
14. Rice Oxley, M.K. and Shearer, W.V. (1929): Astronomy for Surveyors. Methuen and Company Ltd. and Company, London.
15. Robinson, A. H. H., Sale R., Morrison J. and Muehrcke, P. C (1984): Elements of Cartography. 6th edition John Wiley and Sons, New York.
16. Shaw, G. and Wheeler, D. (1994): Statistical Techniques in Geographical Analysis. Prentice Hall, Englewood Cliffs, New Jersey.
17. Singh, R. L. and Singh, Rana P.B. (1993): Elements of Practical Geography. Kalyani Publishers, Ludhiana and New Delhi. (English and Hindi editions).
18. Strahler, A.N. (1971): The Earth Sciences. Harper and Row Publishers; New York.
19. Thrower, N. (1996): Maps and Civilisation. Cartography, Culture and Society. University of Chicago Press, Chicago.
20. Unwin, D. (1982): Introductory Spatial Analysis. Methuen and Company Ltd., London.
21. Walford, N. (1995): Geographical Data Analysis. John Wiley and Sons, Chichester.
22. Duggal, S. K. (2014): Surveying McGraw Hill Education (India) Private Limited, Fourth edition, Delhi

Websites:

Indian Institute of Surveying & Mapping: <http://www.iism.nic.in/>

Survey of India Department of Science & Technology: <http://www.surveyofindia.gov.in/>

Indian National Cartographic Association: <https://incaindia.org/>

Bhuvan Indian Geo Platform of ISRO: <https://bhuvan.nrsc.gov.in/>

CCS-204: Social and Cultural Geography

Course outcomes (Cos):

1. To study and identify the philosophical base, problems associated with society & its culture.
2. To know about the culture, cultural regions, hearths and their diffusion, realms, and distribution of races.
3. To study and knowing of socio-cultural diversity of India, and processes of social changes.
4. To understand the social justice and well-being of society, to find out the level of well-being in India.

Unit-1: Social Geography

15 Lectures

Philosophical bases of Social and Cultural Geography. Definition, scope, and significance of Social and Cultural Geography. Roots of Social Geography and social problem, housing space and society, and geography of poverty.

Unit-2: Culture and Races

15 Lectures

Concept of culture, culture areas and culture regions, Cultural hearths and their diffusion, World Culture Realms. Concept of race, Griffith Taylor and C.S. Coon's Theories of distribution of races of mankind in the world. Basis of racial classification and their physical characteristics. Races of India.

Unit-3: Socio-cultural Diversity

15 Lectures

Concept of Dialects and ethnicity. Distribution of Religion, Caste, Tribe, Languages in India. Concept of social areas, North-South-Socio-Cultural diversity of India, Processes of Social changes: Modernization, Sanskritization and Globalization.

Unit-4: Social Justice and Well-being

15 Lectures

Concept of social Justice and fair society, Equality and welfare, social development and well-being. Indicators for measurement, Levels of well-being in India, Social status of women in India.

References:

1. Ahmad, Aijazuddin (1999): Social Geography, Rawat Publications, Jaipur.
2. Blij, H.J. (1995): The earth-An introduction to its Physical and Human Geography, John Wiley & Sons; New York.
3. Broad, Jan O.M. & Webb, John W. (1973): A Geography of mankind, McGraw Hill Book Co. New York.
4. Cater, Hohn & Jones, Trevor (1989): Social Geography-An Introduction to Contemporary Issues, Arnold Publishers, New Delhi.
5. Jackson, Peter (1989): Maps of meaning- An Introduction to cultural Geography, Unwin Hyman, and London.
6. Jackson, Richard H. & Loyd E. Hudman (1990): Cultural Geography-People, Places and Environment West publishing co., New York.
7. Jones, Emrys & Eyles, John (1977): An Introduction to social Geography, Oxford University Press, Oxford.
8. Jordan, Terry G. & Rowntree, Lester (1976): The Human Mosaic-A Thematic Introduction to Cultural Geography, Canfield press, San Francis Co., Harper & Row Publisher, New York.
9. Tripathi, R.S. & Parmar, S.B. Singh: Social and Economic Development in India, Ashish Publishing House New Delhi, PP 451-454.
10. Smith, David M. (1977): Human Geography- A Welfare approach, Arnold-Hinmann, London.
11. Hussain, Majid (1994): Human Geography, Rawat Publications, Jaipur.
12. Singh, Joginder (): Sanskritization in India.
13. Soffer, David E. (ed.) (1980): An Exploration of India: Geographical Perspectives on Society and Culture, Cornell Uni. Press, New York.

CCPr-205.1: Computer Application in Geography**Course Outcomes (COs):**

1. To learn the representation of geographic data using various computational methods;
2. To know about sources and uses of online educational resources and e-learning methods;
3. To develop writing, editing, and presentation skill for representation of geographical information;
4. To compute statistical parameters with the help of computer;
5. To prepare and design maps and graphs with the help of computer software;
6. To apply computational techniques relevant in the discipline of Geography;

Unit-I: Geographic data: types and sources; Computer hardware and software; Online educational resources; E-learning. **30 Hrs.**

Practical Exercise(s):

- 1: Description with examples about geographic data types and sources.
- 2: Illustration of computer hardware and their uses.
- 3: Demonstration of useful software packages/ programs and their application.
- 4: Identification, browsing, and storing/ retrieving online educational resources.
- 5: How to access and use e-resources for effective and updated learning?
- 6: Comprehensive browsing and listing of useful geographical websites.
- 7: E-learning objectives, methods, and listing of open online e-learning websites.
- 8-9: E-learning through open online courses: MOOCS – SWAYAM and NPTEL.
- 10-11: E-learning through e-content: e-PG Pathshala, and interactive learning solutions: Moodle.

Unit-2: Writing / formatting of texts, graphs, tables, and references using MS word; Preparation of power point presentation using MS power point; Computation of statistical parameters using MS excel. **25 Hrs.**

Practical Exercise(s):

- 12: Writing / formatting of text paragraphs.
- 13: Inserting, creating, and editing of text box, smart art, pictures and graphs.
- 14: Construction and editing of tables (with and without formatting).
- 15: Reference writing styles using MS word with examples.
- 16: Preparation of MS power point presentation.
- 17: Measures of central tendency: Computation of average, median and mode.
- 18: Measures of central tendency: Calculation of weighted mean.
- 19: Measures of position: Estimation of quartiles, deciles, and percentiles.
- 20: Measures of variation: Computation of range, variance, and standard deviation.
- 21: Calculation of co-relation coefficient.

Unit-3: Presentation and analysis of geographic data (physical and socio-economic) using graphs, charts, maps and map labeling with the help of computer. **25 Hrs.**

Practical Exercise(s):

- 22-26: Presentation and analysis of geographic data using MS Excel – preparation of graphs/charts (bar graph, line graph, pie diagram, scatter diagram and trend line).
- 27: Co-relation and regression analysis using MS Excel.
- 28: Presentation and illustration of geographic data – preparation of maps with labeling.
- 29-30: Presentation and analysis of geographic data using Origin and SPSS.

References:

1. **Burt, J.E.**, Barber, G.M., and Rigby, D.L. (2009): *Elementary Statistics for Geographers (3rd Ed.)*, The Guilford Press, 653pp.
2. **Dale, N.**, and Lewis, J. (2002): *Computer Science Illuminated*, Jones and Bartlett Publishers, Sudbury, MA, USA, 656pp.
3. **Maguire, D.J.** (1989): *Computers in Geography*, Longman, London, 272pp.
4. **Mather, P.M.** (1991): *Computer Applications in Geography*, Wiley, New York, USA, 270pp.
5. **McFedries, P.** (2007): *Formulas and Functions with Microsoft Office Excel 2007*, Que/Pearson, Indianapolis, Indiana, USA, 523pp.
6. **McGrew, J.C.**, and Monroe, C.B. (2009): *An Introduction to Statistical Problem Solving in Geography (2nd Ed.)*, Waveland Pr Inc, 254pp.
7. **Miller, M.** (2007): *Absolute beginner's guide to computer basics (4th Ed.)*, Que/Pearson, Indianapolis, Indiana, USA, 430pp.
8. **Monmonier, M.S.** (1982): *Computer Assisted Cartography: Principles and Prospects*, Prentice Hall, 214pp.
9. **Pal, S.K.** (1998): *Statistics for Geoscientists: Techniques and Applications*, Concept Publishing, New Delhi, India, 610pp.
10. **Robinson, A.H.**, Morrison, J.L., Muehrcke, P.C., Kimerling, A.J., and Guptill, S.C. (1995): *Elements of Cartography (6th Ed.)*, Wiley, New York, 688pp.
11. **Sarkar, A.** (2009): *Practical Geography: A Systematic Approach*, Orient BlackSwan, Hyderabad, India, 408pp.
12. **Ulrich, L.A.** (2003): *How to Do Everything with Microsoft Office 2003*, McGraw-Hill/Osborne, Emeryville, California, USA, 456pp.
13. **Unwin, D.J.**, and Dawson, J.A. (1985): *Computer Programming for Geographers*, Longman, London, 264pp.
14. **Walkenbach, J.**, Tyson, H., Wempen, F., Prague, C.N., Groh, M.R., Aitken, P.G., Irwin, M.R., Powell, G., and Bucki, L.A. (2007): *Office 2007 Bible*, Wiley, Indianapolis, Indiana, USA, 1224pp.

Websites:

e-PG Pathshala: <https://epgp.inflibnet.ac.in/>

MOOCS - NPTEL: <https://nptel.ac.in/>

MOOCS - SWAYAM: <https://swayam.gov.in/>

National Digital Library of India: <https://ndl.iitkgp.ac.in/>

Shivaji University Library (E-Resources): <http://www.unishivaji.ac.in/library/E-Resources>

CCPr-205.2: Statistical Techniques in Geography**Course Outcomes (COs):**

1. To understand the importance and use of statistical techniques in geography
2. To form frequency distributions tables and graphically interpret the results.
3. To measure central tendency and dispersion of data.
4. To examine relationship between two or more variables with correlation and regression analysis.
5. To apply comprehensive knowledge of statistics for analysis of geographical data

Unit-1: Basics of Statistics**20 Hrs.****Practical Exercise(s):**

- 1: Definitions of statistics
- 2: Importance and use of statistical techniques in geography
- 3: Sources of statistical data in geography
- 4: Scale of measurement: Nominal, Ordinal, Interval and Ratio
- 5: Formation of frequency distribution table
- 6-9: Graphical representation of frequency distribution using Histogram, Frequency Polygon, O give curve, Cumulative percentage curve

Unit-2: Measures of Statistics**30 Hrs.****Practical Exercise(s):**

- 10-13: Measures of central tendency using simple, discrete and continuous data: Mean, Median and Mode.
- 14-16: Measures of position: Estimation of quartiles, deciles and percentiles.
- 17-20: Measures of dispersion: Absolute measurements- Mean deviation, Quartile deviation, and Standard deviation.
- 21-25: Relative measurements: Coefficient of mean deviation, Coefficient of quartile deviation, Coefficient of variations, Index variability and Relative variability.

Unit-3: Analysis of Statistical Relationship**30 Hrs.****Practical Exercise(s):**

- 26-27: Skewness: Karl Pearson's and Bowley's methods
- 28: Kurtosis
- 29-30: Correlation analysis: Rank order correlation and Product moment correlation
- 31-32: Regression analysis: Simple and Multiple Regression
- 33: Least square method.

References:

1. Cole, J.P. & King, C.A.M. (1968): Quantitative Techniques in Geography. John Wiley & sons Inc. New York.
2. Gregory, S. (1968): Statistical methods and the geographer. Longman, London.
3. Elhance, D.N. (1972): Fundamentals of statistics, Kitab Mahal, Allahabad.
4. Mahmood, A. (1977): Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi
5. Gupta, C.B. (1978); An introduction to statistical Methods, Vikas Pub.House, New Delhi.
6. Hoel P.G.: Elementary Statistics, Wiley, New York.
7. King, L.J. (1991): Statistical Analysis in geography. Prentice Hall, Englewood Cliff N.J.
8. Hemawati: Statistical Methods for Geographers.
9. Singh R. L.: Elements of Practical Geography.
10. Alvi, Z. (1995): Statistical Geography: Methods and Applications, Rawat Publications, Jaipur

CCPr-205.3: Quantitative Techniques in Geography**Course Outcomes (COs):**

1. To understand correlation and regression among spatio-temporal data
2. To learn what is Spatial Analysis
3. For The Measurement Levels and Spatial Data
4. To Measures probability
5. To became expert in techniques for analysis of data in research
6. For Exploratory Data Analysis

Unit-1: Introduction to Quantitative Techniques and Probability Distribution**10 Hrs.**

1. Introduction to quantitative technique and its use in Geography
2. Probability - Introduction
3. Normal probability
4. Poisson probability
5. Binomial probability

Unit-2: Hypothesis Testing**30 Hrs.**

6. Hypothesis testing
7. Chi-square test
8. Student's t-test
9. The Man – Whitney U test
10. The Wilcoxon test for paired samples
11. Analysis of variance
12. Kruskal – wallis analysis of variance
13. Snedecor's variance ratio test (F test)
14. ANOVA- One way
15. ANOVA- Two ways (single entry and multiple entry)

Unit-3: Measures of Spatial Distribution and Models**40 Hrs.**

16. Point and line distribution
17. Quadrat Analysis
18. Nearest neighbour index
19. The Join Count statistics
20. Moran's I statistics
- 21-23. Combinational Analysis - Nelson's method; Raffiullah's method; Ternary diagram
24. Importance of models in geography
25. Models as quantitative techniques
26. Simulation models
27. Gravity models
28. Transportation model

Reference:

1. **Cole, J.P. & King, C.A.M.** (1968): *Quantitative Techniques in Geography*. John Wiley & sons Inc. New York.
2. **R Hammond & P S McCullagh** (1978): *Quantitative techniques in Geography An Introduction (2nd Ed.)*, Oxford University Press, USA, 384pp.
3. **Burt, J.E., Barber, G.M., and Rigby, D.L.** (2009): *Elementary Statistics for Geographers (3rd Ed.)*, The Guilford Press, 653pp.
4. **Mahmood, A.** (1977): *Statistical Methods in Geographical Studies*, Rajesh Pub, New Delhi, 172pp.