

Syllabus for Post Graduate Course

Postgraduate Course in Geography
(Masters of Arts/Science)

Under

Choice Based Credit System

With Course Rationale and Learning Based Outcomes



2021 - 2023

**School of Geography
Gangadhar Meher University
Sambalpur-768004**



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School of Geography

Gangadhar Meher University
Amruta Vihar, Sambalpur -768004

Preamble

Gangadhar Meher University (GMU), Sambalpur was established on 30th May 2015, which has already been a sought-after higher education institution (Gangadhar Meher College, established 1944) in the Western Odisha. The university has seen – *‘several generations of men and women of all hues, all the children of the eternal mother [...] not just the nascent decades of post independent India but the eager and aspirational youth of the new millennial Odisha’*¹. It excels in the region in educating in all regular scientific streams such as Science, Commerce and Arts as well as professional courses such as business administration. The university approved by University Grant Commission (UGC) and has been accredited as ‘A’ by National Assessment and Accreditation Council (NAAC). The institutes provides Undergraduate (UG), Postgraduate (PG), Masters of Philosophy (M.Phil. until 2021) and Doctor of Philosophy (Ph.D.) programme in various disciplines covering Science, Arts, Commerce, Information Science and Management.

Among many disciplines being taught in the GM University, Geography is one core subject that is being offered under both Science and Arts Streams by the university.

Geography in GM University

Introduction

Geography is the study of Earth and Man and their interrelationships covering both natural and human environments. It studies places and people and their relationships within and between. Geographers investigate both the physical characteristics of Earth's surface and the human societies spread across the globe (National Geographic Society, 2023). Students, by opting for the geography as major during the undergraduate programme, discover about the features and process on Earth surface as well as their interaction with humans exploring – how these interactions impact their environments and shapes the humanity.

The university has Postgraduate department of Geography that operates under Faculty of Earth and Environmental Sciences. The institute provides Bachelors of Arts/Science (B.A./B.Sc.) in Geography [Honours], Bachelors of Education in Geography [Honours], Masters of Arts/Science (M.A./M.Sc.) in Geography and Doctor of Philosophy (Ph.D.) in Geography.

The School of Geography

School of Geography (the then department of Geography), established in 1964, has been an essential department of the institution and conducted UG and PG courses since then providing Bachelors of Arts (B.A) and Master of Arts (M.A.) in Geography. After the

¹ Prof. N Nagaraju, Hon'ble Vice-Chancellor, GM University (2020-).

establishment of GM University in 2015, M. Phil. and Ph.D. programmes were introduced in the department from 2018. The M. Phil. Programme continued until 2021 and was stopped being offered as UGC discontinued the degree in 2021. During this period, ten scholars have been awarded M.Phil. Degree in Geography. Under the Doctor of Philosophy (Ph.D.) programme in Geography, 2 scholars have been awarded PhD while 13 scholars are continuing their doctoral research in various stages covering both physical and social dimensions of Geography. Since 2021, the department is offering B.Sc. in Geography [Honours] while M.Sc. in Geography is being offered since 2022.

Thereby, at present, the School of Geography is offering both B.A. and B.Sc. in Geography [Honours] and Integrated B.Ed. in Geography under its undergraduate programme; M.A. and M.Sc. in Geography under its postgraduate programme; and, Ph.D. in Geography under its research programme.

The School of Geography at GMU put its efforts to educate students in academic and professional skills and aids them in growing as capable and thoughtful geographers. We prepare our students to contribute well in nurturing the discipline as well as people around them and world at large. Students of our department have achieved various milestones and are placed in various institutions in Odisha and beyond.

Vision and Mission of the School of Geography

With the intention to keep the traditional and noble roots intact, the school offers has following vision and missions:

Vision

The School of Geography envisions becoming a leading centre of teaching and research in spatial sciences in India by preparing its students as productive citizens through relevant education and harnessing the integrative nature of geography as a discipline to promote sustainable development through research.

Missions

School of Geography, GMU is committed to achieve its vision through measurable actions in the form of following mission:

1. To produce and disseminate new geographical knowledge and insights on key environmental, socio-cultural and economic issues.
2. To undertake cutting-edge geographical research applying relevant tools and techniques including Remote sensing (RS) and Geographic Information (GIS) to answer fundamental questions of local, national and global importance.
3. To provide students with effective and relevant theoretical and practical knowledge necessary for professional development.
4. To orient students to think critically and to celebrate diversity as global citizens by realizing their own place, values and responsibilities to other people, to the environment and to earth's sustainability.

Resources in the School of Geography

Faculties and Support Staffs

At present, the department has four permanent faculties: 1 Professor, 2 Associate Professor and 4 Assistant Professor (all PhD holders from reputed institutions in India and Abroad).

They have sizable experiences in wide-ranging and evolving geographical field covering natural as well as social sciences (particularly Geo-informatics, Natural resource management, Disaster management, Hydrology, Development studies, Socio-cultural geography, Population studies and Public health). Additional positions (1 Professor and 2 Assistant Professor) are also there in the department and waiting for the recruitment.

Furthermore, the department is supported by 1 lab-assistant and 1 lab-associate as well as guest faculties as and when required. Research Scholars in the department also contribute in the department wherever opportunity arises for them.

Practical Facilities

The department has two practical labs (1 for PG and 1 for UG), which are also used for classes. There are various instruments specific for the practical classes of Geography such as Geography Practical Tables, Light Tables and Geometric instruments (various sizes), Specific Pens (e.g. Rottering Pen), Scales and Stereoscopes. The department has range of Toposheet, Aerial Images and Satellite images. The department is also supported by a Departmental Library, Store Room and a Research Scholars' room.

Postgraduate (PG) in Geography – Specification

Introduction – MA/MSc in Geography

Our PG curriculum built on our UG curriculum and deals with man and earth covering different associated phenomena and features on advance level. These UG programs are structured to provide dedicated training in many geography centric areas covering training in both descriptive and analytical skills while our PG curriculum takes the learning to next level by training students in advanced and applied side of Geography. Our cutting-edge postgraduate program (M.A. and M.Sc. in Geography) is suitable for students, who are enthusiastic about pursuing further understanding of man's role (economic, social, and political) in the world using modern methods, tools and approaches. The PG Syllabus is more focused on the applied side of the sub-braches (e.g. Geomorphology, Cartography, Climate, Oceans, Population, Society, Culture, Economic, Resource, Environment, Settlement, Regional Studies etc.) of the subject 'Geography'.

The students could opt for electives from Science or Arts Stream as per their inclination towards the Physical or Human Geography. Further, due to the evolving world affairs, Geography has been rapidly evolving significantly in current interdisciplinary era and encompasses newer fields such as Climate Change, Global Health and Sustainable Resource Management. Our PG syllabus extensively covers these contemporary topics and assist student in envisioning what lies ahead for them.

Aims and Objectives of PG programme in Geography

Aim

The postgraduate program in Geography at GMU aims to educate Geography to postgraduate students following a standard and concrete educational framework [Outcome Based Learning (OBL) Framework, as required by UGC and NAAC], around which, the subject of Geography is well spaced and paced – assisting students to conveniently further their UG-

level learnings in Geography to next advanced level with focus on employability, entrepreneurship and skill development of the students.

Objectives

To fulfil its aim, the postgraduate curriculum of Geography intends to –

1. Educate students in advance conceptual frameworks with in the different facets of geography covering both physical and human side of the discipline.
2. Acquaint the students in identification and analysis of various geographic specialities covering range of features and processes involved.
3. Encourage students to acquire advance level understandings and abilities, on individual as well as team levels, to carry out geographic field work.
4. To assist students to learn the science and art of collecting, processing and interpreting the geographic data.
5. To facilitate modern and contemporary cartographic skills to the students.
6. Guide students to visualise geographic space as well as the geographic concepts at different scales including space, time and mind.
7. Make students acquaint with latest spatial tools and techniques (such as Spatial Statistics, Remote Sensing and Geographic Information System).
8. Assist students in translating their learning in academia to something practically useful to the real world they are about to enter.

Outcome – Based Learning (OBL) Approach in PG curriculum for Geography

OBL Structure

GM University follows OBL approach as its educational framework, which uses goals (outcomes) that need to be achieved by each student by the end of their programme after following the curriculum². The approach intends for the holistic development of the students through opportunities to explore the real world using various ways such as field work and extension outreach activities. It facilitates a format of courses designed to develop strong subject knowledge to keep the students aware of different sides of the subject. Subsequently, the OBL based syllabus focuses on skill development and employability of the students. It promotes structural uniformity within the curriculum of different disciplines as well as with the curriculums of same subject across universities of the country.

The OBL based curriculum delineates Programme Outcomes (POs) at the University Level, Programme Specific Outcomes (PSOs) and Course Outcomes (COs) for each courses run in the department at the Department level. These POs, PSOs and COs of the curriculum should be connected and could be mapped in the students' performance in their assessments (e.g. examination, assignments etc.).

OBL in PG Geography at GMU

Geography is scientific-based and society-oriented that focuses on spatio-temporal analyses. OBL based curriculum for the UG programme of Geography allows UG students to:

- understand the developmental journey of Geography as subject;

² NAAC Institutional Accreditation Manual for Self-study Report, 2020

- explore and excel in various concepts, theories and frameworks associated with the different aspects of this discipline through range of papers covering both physical and human side of Geography; and,
- learn effortlessly and deal with the contemporary issues of the world.

Thus, our OBL based PG curriculum focuses in helping the students to recognize the latest spatial tools and techniques, which would be helpful for the formation of their geographical understanding of this world. It assists the students to perceive, create and evaluate sound geographical constructs and concepts.

Our PG curriculum is designed to focus on local concerns and has been cultivated in light of addressing the needs and expectations of the local and regional students from wide range of academic as well as personal backgrounds. It is designed as student centric and our teaching and learning process is strengthened by covering global to local issues and examples. The curriculum covers essential concepts of both physical and human domains of Geography along with suitable tools and techniques.

Thereby, in our school of Geography, our proposed PSOs and COs for each course in PG Programme for Geography have been adapted and reframed as per our aim and objectives of the programme and within the scope of resources available to the school.

Choice Based Credit System (CBCS): Curriculum for PG Geography in GMU

Syllabus aligned with UGC

MA/MSc in Geography is a two-year postgraduate course under the *Choice Based Credit System (CBCS)* organised as –

1. Main Courses,
2. Practical Courses,
3. Elective - Discipline Specific (DSE) courses and
4. Inter Disciplinary Specific (IDSE) Courses.

Main courses span over critical field within Geography that needs to be studied for core geographical knowledge. This syllabus is aligned with the graduate attribute outlined by UGC (University Grant Commission, India) in Geography that covers:

- A. Theory – covers theoretical and conceptual fundamentals of geography.
- B. Practical – spans over spatial Statistical Techniques, RS, GIS, Research Methods and Geographical Fieldwork
- C. Regional coverage – covers World Geography, Geography of India, Geography of different states
- D. Application Oriented – includes application-based courses such as disaster management and Environmental Geography etc.

Each Course has one aim, minimum four COs, four units and reading list including books on regional languages wherever possible.

Pedagogy

Our pedagogy for PG process includes:

- Lectures and tutorials
- Practical classes
- Assignments (individual and group)

- Extension Activities (to benefit society)
- Case studies
- Field work
- Team work
- Presentation of learning through various means (report to power points to any other creative methods such as posters and flyers)
- Scientific reading and writing as well as scientific communication
- Academic and practical world interface

Evaluation

Our teaching and evaluation framework intend to:

1. Periodic review of course, teaching resources and methods as well as the performance of students;
2. Encourage students for critical and creative thinking;
3. Realisation of learning outcomes all courses in Geography;
4. Maintain the teaching standards to its best; and,
5. Confirmation of students' Geography specific as well as overall alumna attributes.

Learning Outcomes

Our programme focuses on following distinct and major learning outcomes:

- Realise the significance of geographical information overall as well as its implications in day to day lives.
- Able to communicate geographic information.
- Could critique geographical theories and studies.
- Could use geographical research tools such as cartography, spatial statistics, RS and GIS efficiently and effectively.
- Should be able to understand the contemporary spatial issues pertaining to all scale ranging from local to global levels and figure out apt and sensible solutions.
- Evaluate and resolve geographical problems in effective manner.

Graduate Attributes of Aspired Advanced Geographers

We, at GMU, aspire students to cultivate specific graduate attributes suitable to Geographers through the Programme Specific Outcomes (PSOs) of our UG programme in Geography. These PSOs map to the Programme out for UG in GMU. They are discussed below:

Programme Specific Outcomes (PSOs) of PG in Geography in GMU

PSOs delineated by the department at undergraduate level are carried forward to postgraduate level. They are-

PSO 1. Core Competency – Geography undergraduates will appreciate the interactions among man and environment using various quantitative and qualitative methods at local, regional and global scales.

The students of BA Geography will have special understanding of the fundamental spatial concepts associated the man and the earth and the exchanges between them that shapes our Earth and Society. They would explore the realm of social sciences while navigating through Geography.

The students of BSc Geography will have technical perspectives associated the man and the earth and the exchanges between them that shapes our Earth and Society. They would explore the realm of core sciences while navigating through Geography.

- PSO 2. Scientific and Spatial Thinking** – Students will be able to observe, analyse, interpret and draw conclusion based on qualitative and quantitative geographical evidences and methods. Being spatial science, scientific thinking in Geography will equip students with spatial thinking. Spatial thinking will encourage the students to think spatially while resolving their personal and professional issues, making more informed decisions.
- PSO 3. Analytical thinking** – The students will analyse spatial– and temporal– patterns and trends of geographical information in order to utilise the outcome for personal and professional use. They will be able to outline the role of spatial knowledge in resolving the problem.
- PSO 4. Critical Thinking** – Geography undergraduates will be able to think critically, derive conceptual frameworks as and when required, contemplate on scientific methodology, and construct convincing scientific opinions. They will critically be able to evaluate data, methods and outcomes. They shall also be aware of the various biases and logical errors in this process.
- PSO 5. Problem solving** – Geography graduates will be armed with range of geographical approaches required to understand and resolve any problem faced by mankind within the subject’s ambit, be it at local, regional or global scales.
- PSO 6. Research skills** – Geographers will become attentive towards the patterns and trends across space and time, which could enable them to foresee problems and opportunities at all scales on the Earth. Their geographical understanding of past to present happenings on earth could be highly useful to resolve contemporary and future concerns on this planet.
- PSO 7. Teamwork** – Geographers will be able to work individually as well as in team. As the subject is interdisciplinary, it encourages students for team work.
- PSO 8. Communication Skills** – Geography undergraduates will specialize in graduate level communication particularly in spatial communication (mapping). They shall be able to read and comprehend the academic literature available in Geography, perform in-depth assessment (including spatial analysis) and derive logical explanations based on geographical approaches. They shall be able to communicate their idea or findings in coherent manner to broader audiences.
- PSO 9. Digital Literacy** – Students will use multi-facet technologies such as Geographical Information Systems and spatial modelling to assess and solve their concerns. They will also enrich themselves through the learning available in form of e-courses and MOOCs on various government platforms.
- PSO 10. Sustainable development** – Geography undergraduates will obtain fundamental geographical proficiencies to understand and work for the environments surrounding them, be it natural or human. They will be able to take evidence based decisions for sustainable planning and management of their personal and professional resources.
- PSO 11. Ethical Awareness** – Geography undergraduates will become aware of ethics and values required in the discipline, in the academia and in the world at large. They shall also beware of plagiarism and scientific misconduct.

PSO 12. Leadership – Geography undergraduates will become acquainted of spatial decision-making process and they will be able to use this understanding to take lead, as and when required.

PSO 13. Multi-cultural competence – The students will explore multi-cultural aspects through the humane side of Geography, which will assist them in gaining better understanding of the society and becoming more useful to it.

PSO 14. Psychosocial competence – The students will have ability to deal with the weights and challenges of everyday life effectively. S/He will maintain a state of mental well-being and demonstrate it through her/his adaptive and positive behaviour, while interacting with others and their culture and environment. This would allow him to keep a check on any kind of biasness that could be introduced in his work as Geographer.

Using these PSOs, the School of Geography expects its post-graduate students to be skilled at advanced level in the geographical theories, methodologies, tools and techniques. After completion of the PG in Geography from the department, the students shall be able to:

- Demonstrate the knowledge on philosophies, concepts, theories, and methods as well tools and techniques used in geography.
- Acquire, interpret, evaluate, analyse and critique geographic data needed for geographic problem solving.
- Apply the geographic concepts, methods, tools and techniques to answer questions of local, regional and global importance;
- Compare and contrast the geographical theories, concepts and methods; integrate themes pertaining to spatial and temporal patterns; evaluate the human-environment interrelationship across range of people and places; as well as infer the interactions between nature and society.
- Communicate geographic data, concepts, theories and research findings in oral, written, and visual forms, valuing ethics along with having respect for cultural, social and economic diversity;
- Maintain a state of mental well-being and demonstrate it through her/his behaviour, while interacting with others culture and environment, which will facilitate a control on any kind of biasness that could be introduced in his work as Geographer.

Table 1 - The Courses under Post-graduate Programmes, taught in the School of Geography, GMU together with their associated PSOs

Semester	GMU Students	Paper Code	Postgraduate Courses run in the Department	PSO-01	PSO-02	PSO-03	PSO-04	PSO-05	PSO-06	PSO-07	PSO-08	PSO-09	PSO-10	PSO-11	PSO-12	PSO-13	PSO-14	
			Programme Specific Outcomes (PSOs) →	Core Competency	Analytical thinking	Scientific Thinking	Critical Thinking	Problem solving	Research skills	Teamwork	Communication Skills	Digital Literacy	Sustainable Development	Ethical Awareness	Leadership	Multicultural competence	Psychosocial competence	
I	Geographers	101	Advanced Geomorphology	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	-	-	
		102	Geographical Thought	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y
		103	Population Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		104	Geography of India	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
		105	Cartographic Techniques	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
II	Geographers	201	Climatology	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	-	Y	
		202	Economic Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		203	Statistical Methods in Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y
		204	Fundamentals of GIS & Remote Sensing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
		205	Remote Sensing & GIS Applications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
		206 A	Geography of Tourism	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		206 B	Geography of Odisha	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
206 C	Political Geography	Y	Y	Y	Y	Y	Y	Y	-	Y	-	Y	Y	Y	Y	Y		
III	Geographers	301	Oceanography	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	-	Y	-	
		302	Social and Cultural Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		303	Settlement Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		304	Remote Sensing and Image Processing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y
		305	Field survey Methods	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
	Non-Geographers	306 A	Introduction to Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		306 B	Human Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		306 C	Economic Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
IV	Geographers	401	Regional Development & Planning	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	
		402	Environmental Geography	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		403	Disaster Management	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		404	Urbanisation and Migration	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		405	Project work report and VIVA VOCE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
			Note:	Core courses		Practical courses		Discipline Specific Elective			Inter Discipline Specific Elective							

Note: The colours of paper code are based on types of courses as per the CBCS. See page v for details.

Semester	GMU Students	Paper Code	Postgraduate Courses run in the Department	Course Outcome (CO)	PSO-01	PSO-02	PSO-03	PSO-04	PSO-05	PSO-06	PSO-07	PSO-08	PSO-09	PSO-10	PSO-11	PSO-12	PSO-13	PSO-14			
			<i>Programme Specific Outcomes (PSOs) →</i>		<i>Core Competency</i>	<i>Analytical thinking</i>	<i>Scientific Thinking</i>	<i>Critical Thinking</i>	<i>Problem solving</i>	<i>Research skills</i>	<i>Teamwork</i>	<i>Communication Skills</i>	<i>Digital Literacy</i>	<i>Sustainable Development</i>	<i>Ethical Awareness</i>	<i>Leadership</i>	<i>Mult-cultural competence</i>	<i>Psychosocial competence</i>			
					<i>1 - Slightly Related; 2 - Moderately Related; 3 - Strongly Related</i>																
					Note:	Core courses		Practical courses		Discipline Specific Elective			Inter Discipline Specific Elective								
						Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	-	-		
I	Geographers	101	Advanced Geomorphology	CO-01	3	2	3	2	3						2						
				CO-02	3	2	3	2	3		2				2						
				CO-03	3	3	3	3	3	1					3	2	1				
				CO-04	3	2	3	3	3		3		3		3	3	2	2			
		102	Geographical Thought		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	
				CO-01	3	2	1			1		2		1	3		2	1			
				CO-02	3	2	1	1	1	1		2			3			1	1		
				CO-03	3	3	3	3	3	2	1	3			1	3	2	2	2		
		103	Population Geography	CO-01	2	2	2	3	3							1	2		1		
				CO-02	3	3	3	2	2	2	1			1	1	3		2	1		
				CO-03	3	3	3	3	3	3	2	1	2	2	2	3	2	2	2		
				CO-04	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	
		104	Geography of India		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	
				CO-01	3	3	3	1	1	1		1	1		2		1				
				CO-02	3	3	3	2	2	1		1	1		3		1				
				CO-03	3	3	3	3	3	2	2	2	2	2	2	3	1	2	1		
		105	Cartographic Techniques	CO-01	3	3	3	3	3	1		3	1	1	3						
				CO-02	3	3	3	3	3	1	2	3	2		3					2	
				CO-03	3	3	3	3	3	3	3	3	3	3	2	3	2	1	3		
				CO-04	3	3	3	3	3	2	3	3	3	3	3	3	3	3	2		

Figure 1 - The Courses under Post-graduate Programmes, taught in the School of Geography, GMU together with their associated PSOs during Semester I

Semester	GMU Students	Paper Code	Postgraduate Courses run in the Department	Course Outcome (CO)	PSO-01	PSO-02	PSO-03	PSO-04	PSO-05	PSO-06	PSO-07	PSO-08	PSO-09	PSO-10	PSO-11	PSO-12	PSO-13	PSO-14		
			Programme Specific Outcomes (PSOs) →		Core Competency	Analytical thinking	Scientific Thinking	Critical Thinking	Problem solving	Research skills	Teamwork	Communication Skills	Digital Literacy	Sustainable Development	Ethical Awareness	Leadership	Mult-cultural competence	Psychosocial competence		
1 - Slightly Related; 2 - Moderately Related; 3 - Strongly Related																				
Note:					Core courses		Practical courses		Discipline Specific Elective			Inter Discipline Specific Elective								
II	Geographers	201	Climatology		Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	-	Y		
				CO-01	3	3	3	3	3					1	1	2			1	
				CO-02	3	3	3	3	3	1					1	3				2
				CO-03	3	3	3	3	3	2	1				2	3	1			
		202	Economic Geography		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
				CO-01	2	2	2	2	1						1	2			1	
				CO-02	3	3	3	3	3	2					1	2	2	1		
				CO-03	3	3	3	3	3	3	2	1			2	2	3	2	1	1
		203	Statistical Methods in Geography	CO-04	3	3	3	3	3	3	2				2	3	3	2		
					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y
				CO-01	3	3	3	1	3	1					2		3			1
				CO-02	3	3	3	2	3	2					2	1	3			1
		204	Fundamentals of GIS & Remote Sensing	CO-03	3	3	3	3	3	3	1				2	2	3	2		2
				CO-04	3	3	3	3	3	3	1	2			3	2	3	2		1
					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
				CO-01	3	3	3	3	3						3	1	2			
		205	Remote Sensing & GIS Applications	CO-02	3	3	3	3	3						3	2	2			
				CO-03	3	3	3	3	3	2	1	2			3	2	2			1
				CO-04	3	3	3	3	3	2	2	3	3	3	3	2			1	2
					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y
		206 A	Geography of Tourism	CO-01	2	1	1	1	1	1	1					1	2			2
				CO-02	2	1	1	1	2	1						1	2			2
				CO-03	3	2	2	2	2	1	2	2				1	2			3
				CO-04	3	3	2	3	3	2	2	3	3			2	2	3		
		206 B	Geography of Odisha		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
				CO-01	3	3	1	1	2							1	2			1
				CO-02	3	3	2	2	3	1						1	2			2
				CO-03	3	3	3	3	3	2	1				1	2	2	1		
		206 C	Political Geography	CO-04	3	3	3	3	3	2	2	2	2	2	1	1	2	2		
					Y	Y	Y	Y	Y	Y	-	Y	-	Y	Y	Y	Y	Y	Y	Y
				CO-01	3	1		1										1		
				CO-02	3	1	1	2	1						1	2				2
CO-03	3	2	1	2	2	1					2	2	3	1	2	1				
CO-04	3	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2			

Figure 2 - The Courses under Post-graduate Programmes, taught in the School of Geography, GMU together with their associated PSOs during Semester II

Semester	GMU Students	Paper Code	Postgraduate Courses run in the Department	Course Outcome (CO)	PSO-01	PSO-02	PSO-03	PSO-04	PSO-05	PSO-06	PSO-07	PSO-08	PSO-09	PSO-10	PSO-11	PSO-12	PSO-13	PSO-14			
			Programme Specific Outcomes (PSOs) →		Core Competency	Analytical thinking	Scientific Thinking	Critical Thinking	Problem solving	Research skills	Teamwork	Communication Skills	Digital Literacy	Sustainable Development	Ethical Awareness	Leadership	Multicultural competence	Psychosocial competence			
1 - Slightly Related; 2 - Moderately Related; 3 - Strongly Related																					
Note:					Core courses			Practical courses			Discipline Specific Elective			Inter Discipline Specific Elective							
III	Geographers	301	Oceanography		Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	-	Y	-			
				CO-01	3	3	3	1	2	1			2	1	2			1			
				CO-02	3	3	3	1	2					2	2						
				CO-03	3	3	3	3	3	2				2	3	3				1	
		CO-04	3	3	3	2	3	3					3	3				1			
			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		302	Social and Cultural Geography		3	1	1														
				CO-02	3	1	1	1	2	1					2	3			1	2	
				CO-03	3	3	2	2	3	2	1	2	1	2	3	1	2			2	
				CO-04	3	3	3	3	2	3	2	2	2	2	3	3	2				2
			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
		303	Settlement Geography		3	2	2	2									2		1		
	CO-02			3	3	2	3			1				1	3			2			
	CO-03			3	3	3	3	3	2	1	2	1	2	3	2	3	2		2	2	
	CO-04			3	3	3	3	3	3	3	1	2	1	3	3	2	2	2	3		
		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y			
	304	Remote Sensing and Image Processing		3	3	3	3	3						3	1	2					
			CO-02	3	3	3	3	3					3	2	2						
			CO-03	3	3	3	3	3	2	1	2	3	2	2	2					2	
			CO-04	3	3	3	3	3	2	2	3	3	3	3	2					3	
		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
	305	Field survey Methods		2	3	3	3	3	1					1		3		1			
			CO-02	2	3	3	3	3	2	2				1		3		2	2		
			CO-03	2	3	3	3	3	3	3	2		2	1	3	2	2	2	2		
CO-04			3	3	3	3	3	3	3	3	2	3	2	3	2	3	3	3			
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Non-Geographers	306 A	Introduction to Geography		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
			CO-01	2	2	1	1									1			1		
			CO-02	2	2	2	2	1							1	2					
			CO-03	2	2	2	2	1	1						1	2					
	CO-04	3	3	3	3	2	2	1	1	1	1	2	3	1	2	2					
		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
	306 B	Human Geography		3	2	2	2								1	2		2			
			CO-02	3	3	3	3	3	1	3			3	1	2	1	3				
			CO-03	3	3	3	3	3	2	3	1				2		3				
			CO-04	3	3	3	3	3	2	3	2			3	3	2	3	2			
		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
	306 C	Economic Geography		3	2	2	2	1							1	2		1			
CO-02			3	3	3	3	3	2					1	1	2			1			
CO-03			3	2	2	2	2							1	2	1	2	1			
CO-04			3	3	3	3	3	2	2	1	1	1	2	2	2	2	2	2			
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			

Figure 3 - The Courses under Post-graduate Programmes, taught in the School of Geography, GMU together with their associated PSOs during Semester III

Semester	GMU Students	Paper Code	Postgraduate Courses run in the Department	Course Outcome (CO)	PSO-01	PSO-02	PSO-03	PSO-04	PSO-05	PSO-06	PSO-07	PSO-08	PSO-09	PSO-10	PSO-11	PSO-12	PSO-13	PSO-14			
			<i>Programme Specific Outcomes (PSOs) →</i>		<i>Core Competency</i>	<i>Analytical thinking</i>	<i>Scientific Thinking</i>	<i>Critical Thinking</i>	<i>Problem solving</i>	<i>Research skills</i>	<i>Teamwork</i>	<i>Communication Skills</i>	<i>Digital Literacy</i>	<i>Sustainable Development</i>	<i>Ethical Awareness</i>	<i>Leadership</i>	<i>Mult-cultural competence</i>	<i>Psychosocial competence</i>			
<i>1 - Slightly Related; 2- Moderately Related; 3 - Strongly Related</i>																					
Note:					Core courses			Practical courses			Discipline Specific Elective				Inter Discipline Specific Elective						
IV	Geographers	401	Regional Development & Planning		Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y			
				CO-01	3	3	2	3	2				1	1	2			2	1		
				CO-02	3	3	3	3	3						2	2			2		
				CO-03	3	3	3	3	3	2	1			1	2	2	1			2	
				CO-04	3	3	3	3	3	2	2				3	2	2	1		2	
		402	Environmental Geography		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
				CO-01	3	3	3	3	3	1		1		1	2			1	2		
				CO-02	3	3	3	3	3					2	2	2				1	
				CO-03	3	3	3	3	3	2	1	1	1	2	2	2	1				
				CO-04	3	3	3	3	3	2	2	2	2	2	3	2	2	1		1	1
		403	Disaster Management		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
				CO-01	3	3	3	1	3								3				1
				CO-02	3	3	3	2	3	1				1			3			1	
				CO-03	3	3	3	3	3	2	2	1			2	3	2	2	2	2	2
				CO-04	3	3	3	3	3	3	2	1	2	2	2	3	2				2
		404	Urbanisation and Migration		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
				CO-01	3	3	3	3	3						1	1	2			2	
				CO-02	3	3	3	3	3	1					1	1	2			2	
				CO-03	3	3	3	3	3	2	1				2	2	2	2	2	2	
				CO-04	3	3	3	3	3	2	2	1			2	2	2	2	2	2	
405	Project work report and VIVA VOCE		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
		CO-01	3	3	3	3	3	3			1	1	2	3	2	1		2			
		CO-02	3	3	3	3	3	3	2				1	2	3	2	2	2	2		
		CO-03	3	3	3	3	3	3	2	2	2	2	3	3	2	2	2	2	2		
		CO-04	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3		
Note:					Core courses			Practical courses			Discipline Specific Elective				Inter Discipline Specific Elective						

Figure 4 - The Courses under Post-graduate Programmes, taught in the School of Geography, GMU together with their associated PSOs during Semester IV

PSOs mapping to POs of GMU

Following table map the PSOs delineated in the department to PO of PG Programme in the GMU –

Table 2 - Mapping of PSOs in School of Geography to POs in GMU

		PO-01	PO-02	PO-03	PO-04	PO-05	PO-06	PO-07
		Critical Thinking	Effective Communication	Social Interaction	Effective Citizenship	Values and Ethics	Environment and Sustainability	Self-directed and Life-long Learning
PSO-01	Core Competency	√	√	√			√	√
PSO-02	Analytical thinking	√			√		√	√
PSO-03	Scientific Thinking	√					√	√
PSO-04	Critical Thinking	√			√		√	√
PSO-05	Problems solving	√			√		√	√
PSO-06	Research skills	√		√	√		√	√
PSO-07	Teamwork		√	√	√	√	√	√
PSO-08	Communication Skills		√	√	√	√	√	√
PSO-09	Digital Literacy			√			√	√
PSO-10	Sustainable Development	√	√	√		√	√	√
PSO-11	Ethical Awareness		√	√	√	√	√	√
PSO-12	Leadership	√	√	√	√	√	√	√
PSO-13	Multicultural competence	√		√	√		√	√
PSO-14	Psychosocial competence	√	√	√	√	√		

Qualification Descriptors (QD) for M.A./M.Sc. Programme

The QD for the M.A./M.Sc. programme in Geography shall cover the geographical learning attributes such as core geographical knowledge, field knowledge and use of advance spatial and allied tools and techniques for better comprehension of space and society etc. It shall also involve awareness among the students about the socio-cultural aspects as well as concerns from varied regions.

The main QD for the students of M.A./M.Sc. in Geography is their substantial ability to understand the geographical information at both level – overall and relative to each other. They are also capable to do critical evaluation at significant level. Each Geography Postgraduate student shall be able to –

- 1) Exhibit geographical knowledge scientifically whether it is theoretical or practical
- 2) Critique the geographical aspects whether spatial or temporal scales
- 3) Identify nominal to critical concerns and propose solutions to the problems geographically
- 4) Demonstrate the significance of geography in reducing regional inequalities and aid to the regional development.
- 5) Validate the ability to use the geographical knowledge acquired in the class in real world.
- 6) Comprehend the possibility of geography towards the career opportunities, employment and life-long engagement.
- 7) Utilise the learnings to contribute towards the sustainable development of oneself and everyone else around.

Through the theoretical and practical means of geography, the students will also develop the ability to realise the Sustainable Development Goals (SDG) altogether by indirect or direct participations.

Postgraduate (PG) in Geography – Syllabus in detail

The following section contain detailed syllabus followed in the School of Geography at GM University, Sambalpur with following components based on CBCS as discussed above:

1. Core and Practical Courses
2. Discipline Specific Elective (DSE)
3. Inter-Discipline Specific Elective (IDSE) offered by the department
4. Dissertation

Outcome Based Education

SYLLABUS

for

Master of Arts / Science

in

GEOGRAPHY

UNDER

CHOICE BASED CREDIT SYSTEM



SESSION – 2021-23

SCHOOL OF GEOGRAPHY

GANGADHAR MEHER UNIVERSITY

AMRUTA VIHAR, SAMBALPUR -768004

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GEO (IDSE) – 306 [B]: Human Geography.....	49
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Post Graduate Programme Structure

The Master's programme is a two-year course divided into four semesters each of six-month duration. A student is required to complete 88 credits for the completion of course and the award of degree.

year	semesters	
First year	Semester I	Semester II
Second year	Semester III	Semester IV

The information about the title of courses, credit hours, division of marks etc. of all semester is given below.

Part-I: Semester-I

Papers		Marks		Total Marks	Duration (Hrs)	Credit Hours
Paper No	Title	Mid Term	End Term			
101	Advanced Geomorphology	20	80	100	3	4
102	Geographical Thought	20	80	100	3	4
103	Population Geography	20	80	100	3	4
104	Geography of India	20	80	100	3	4
105	Cartographic Techniques (Practical)			100	3	4
Total				500		20

Part-I: Semester-II

Papers		Marks		Total Marks	Duration (Hrs)	Credit Hours
Paper No	Title	Mid Term	End Term			
201	Climatology	20	80	100	3	4
202	Economic Geography	20	80	100	3	4
203	Statistical Methods in Geography	20	80	100	3	4
204	Fundamentals of GIS & Remote Sensing	20	80	100	3	4
205	Remote Sensing & GIS Applications (Practical)			100	3	4
DSE Papers*						
206 A	Geography of Tourism	20	80	100	3	4
206 B	Geography of Odisha	20	80	100	3	4
206 C	Political Geography	20	80	100	3	4
Total				600		24

*Discipline Specific Elective Paper. Any one paper can be opted by Masters students of School of Geography. Minimum student strength to run the course in each elective paper should be 8.

Part-II: Semester-III

Papers		Marks		Total Marks	Duration (Hrs)	Credit Hours
Paper No	Title	Mid Term	End Term			
301	Oceanography	20	80	100	3	4
302	Socio and Cultural Geography	20	80	100	3	4
303	Settlement Geography	20	80	100	3	4
304	Remote Sensing and Image Processing	20	80	100	3	4
305	Field survey Methods (Practical)			100	3	4
IDSE Papers**						
306 A	Introduction to Geography	20	80	100	3	4
306 B	Human Geography	20	80	100	3	4
306 C	Economic Geography	20	80	100	3	4
Total						24

**Inter discipline specific elective paper. Any one paper can be opted by students of other Schools of G. M. University.

Part-II: Semester-IV

Papers		Marks		Total Marks	Duration (Hrs)	Credit Hours
Paper No	Title	Mid Term	End Term			
401	Regional Development & Planning	20	80	100	3	4
402	Environmental Geography	20	80	100	3	4
403	Disaster Management	20	80	100	3	4
404	Urbanisation and Migration	20	80	100	3	4
405	Project work report and VIVA VOCE (practical papers)		50+50	100	3	4
Total						20
22 papers	Grand Total			2200		88

Semester	Core Courses			Discipline Specific Elective			Inter Discipline Specific Elective			Total No. of Papers	Credits (Per Paper)	Grand Total Credits
	No. of Papers	Credits (Per Paper)	Total Credits	No. of Papers	Credits (Per Paper)	Total Credits	No. of Papers	Credits (Per Paper)	Total Credits			
I	5	4	20	Nil	NA	NA	Nil	NA	NA	5	4	20
II	5	4	20	1	4	4	Nil	NA	NA	6	4	24
III	5	4	20	Nil	NA	NA	1	4	4	6	4	24
IV	5	4	20	Nil	NA	NA	Nil	NA	NA	5	4	20
Total	20	4	80	1	4	4	1	4	4	22	4	88

SEMESTER - 1

GEO – 101: Advanced Geomorphology

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Geomorphology

Aim of the Course:

is to train students in relevant topics of Advance Geomorphology covering its theoretical and practical aspects in order to use the understanding developed in spatial planning and management activities.

Course Outcomes:

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

- I. Analyze complex geomorphic processes and landforms at an advanced level, including their formation, evolution, and interrelationships. Evaluate and apply advanced quantitative methods wherever required.
 - II. Critically assess the role of tectonics, climate, and human activities in shaping landscapes over various spatial and temporal scales.
 - III. Synthesize interdisciplinary knowledge to understand the holistic functioning of geomorphic systems and communicate effectively the outcomes.
 - IV. Apply principles of geomorphology to address real-world problems related to environmental management, land use planning, hazard mitigation, and natural resource conservation.
-

Course Contents:

Unit 1. Perspectives in Geomorphology

- 1.1. Evolution of Geomorphological thoughts and ideas: A general review; Historical Benchmarks in Geomorphology; Progress of Geomorphology in India;
- 1.2. Concepts of scale: spatial, temporal, equilibrium and threshold; Morphogenetic regions;
- 1.3. Approaches to Geomorphology: Structural, climatic, applied and systems approach.
- 1.4. Principles of landform classification: Genetic and hierarchical.

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Fundamental Concepts – I

- 2.1. Earth - A brief review of basics: Origin (Big-bang theory); shape, size and movements of earth; Age (geological history and clock), structure and composition (crust, mantle and core); Location of a place on earth; Rock and Minerals
- 2.2. Forces that produce landforms: Geomorphic process: Endogenetic and Exogenetic forces

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Fundamental Concepts – II

- 3.1. Movement of crust: Continental Drift Theory (A. Wegner); Plate tectonics theory; Mountain building theory (comparative assessment of Kober's and Jeffrey's)

- 3.2. Theories of Isostasy (comparative assessment of Airy, Pratt and Heiskanen)
- 3.3. Geomorphic Cycle and Land Forms; Weathering – concept, controlling factors and types; Erosion – concept, Cycle of erosion (Davis’s model, Penck’s model), interruptions in cycle and rejuvenation of cycle;

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Unit 4. Applied Geomorphology in –

- 4.1. Water and coastal management
- 4.2. Mineral exploration and engineering related works
- 4.3. Regional planning and urbanisation
- 4.4. Hazard and disaster management

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Reading List

1. Allison, R. (2002). *Applied Geomorphology: Theory and Practices*, Wiley Europe,
 2. Bunnett, R.B. (1965), *Physical Geography in diagrams*, Orient Longman Limited
 3. Bridges E. M., 1990: *World Geomorphology*, Cambridge University Press, Cambridge.
 4. Christopherson, Robert W., (2011), *Geosystems: An Introduction to Physical Geography*, 8 Ed., Macmillan Publishing Company
 5. Gautam, A (2010): *Bhautik Bhugol*, Rastogi Publications, Meerut
 6. Hails, J.R. *Applied Geomorphology*, Elsevier, Amsterdam, 1977
 7. Kale V. S. and Gupta A., 2001: *Introduction to Geomorphology*, Orient Longman, Hyderabad.
 8. Kenneth, J.G. and Lewin, J. (2014). *The Basics of Geomorphology: Key Concepts*, Sage Publications, <http://dx.doi.org/10.4135/9781473909984>
 9. Selby, M.J., (2005), *Earth’s Changing Surface*, Indian Edition, OUP
 10. Skinner, Brian J. and Stephen C. Porter (2000), *The Dynamic Earth: An Introduction to physical Geology*, 4th Edition, John Wiley and Sons
 11. Singh, S. (2009): *Physical Geography*, Prayag Pustak, Allahabad
 12. Starhler & Strahler: *Advanced Physical Geography*. John Wiley, New York
 13. Thornbury W. D., 1968: *Principles of Geomorphology*, Wiley.
 14. Wooldridge & Morgan (1968) – Principle of Geomorphology.
-

GEO – 102: Geographical Thought

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic understanding of Geographic concepts.

Aim of the Course:

To provide basic conceptual understanding of evolution of geographical concepts and approaches.

Course Outcomes:

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

- I. Analyze and evaluate the historical development of geographical thought from ancient to contemporary perspectives.
 - II. Examine the contributions of prominent geographers and thinkers to the evolution of geographical thought and Synthesize and compare diverse geographical perspectives
 - III. Identify and critically assess key theoretical frameworks and paradigms in geography.
 - IV. Apply geographical theories and concepts to analyse and interpret real-world phenomena, and Engage in critical reflection on the social, political, and cultural contexts that shape geographical knowledge production and dissemination and communicate effectively.
-

Course Contents:

Unit 1. Introduction

- 1.1. Meaning, Philosophy & Purpose of Geography; Place of Geography in classification of science.
- 1.2. Changing paradigm – Environmental determinism, Possibilism, Aerial differentiation, Spatial Organization.
- 1.3. Dualism- Systematic vs Regional, Physical vs Human
- 1.4. Human-Environment Interaction;

(Covers OBE level – Remember and Understand)

Unit 2. Contribution of different school of thought

- 2.1. Geographic knowledge in ancient & medieval period.
- 2.2. Contribution of German and French School.
- 2.3. Contribution of British and American School.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Contemporary Trends

- 3.1. Quantitative Revolution in Geography
- 3.2. Behaviouralism, Humanism & Radicalism
- 3.3. Structuralism & Post Structuralism; Mordenism & Postmodernism

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Future of Geography

- 4.1. Changing nature, concepts, approaches & methodologies of geography in globalizing world;
- 4.2. Progress in Indian Geography;
- 4.3. Contribution of Indian Geographers

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Arentsen M., Stam R. and Thuijjs R., 2000: *Post-modern Approaches to Space*, ebook.
 2. Bhat, L.S. (2009) *Geography in India (Selected Themes)*. Pearson
 3. Bonnett A., 2008: *What is Geography?* Sage.
 4. Clifford, N.J (2002) – The Future of Geography, *GEOFORUM*, Vol.33, pp 431-436
 5. Dikshit R. D., 1997: *Geographical Thought: A Contextual History of Ideas*, Prentice– Hall India.
 6. Hartshone R., 1959: *Perspectives of Nature of Geography*, Rand MacNally and Co.
 7. Holt-Jensen A., 2011: *Geography: History and Its Concepts: A Students Guide*, SAGE.
 8. Johnston R. J., (Ed.): *Dictionary of Human Geography*, Routledge.
 9. Johnston R. J., 1997: *Geography and Geographers, Anglo-American Human Geography since 1945*, Arnold, London.
 10. Kapur A., 2001: *Indian Geography Voice of Concern*, Concept Publications.
 11. Martin Geoffrey J., 2005: *All Possible Worlds: A History of Geographical Ideas*, Oxford.
 12. Soja, Edward 1989. *Post-modern Geographies*, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi.
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GEO – 103: Population Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

To provide basic conceptual understanding of demographic concepts, population theories and policies.

Course Outcomes:

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

- I. Explore the nature, scope and evolution of population geography and the patterns, processes, and factors influencing the distribution, composition, and change of human populations over time and space.
 - II. Investigate the temporal trend and spatial distribution of population at various scales, from global to local, and examine the reasons behind them such as exploring the complex relation between population and environment.
 - III. Learn demographic skills to analyse population data, including various related measures.
 - IV. Critique the role of government policies, both historical and contemporary, in shaping population dynamics, and evaluate their effectiveness in addressing demographic challenges.
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Course Contents:

Unit 1. Defining the field and Data Sources:

- 1.1. Nature and scope of population geography.
- 1.2. Sources of population data; Population data from UN publications.
- 1.3. Population data sources in India-Census, National Sample Survey; Unique Identification Scheme (*UID*) & National *Population Register* (NPR).

(Covers OBE level – Remember and Understand)

Unit 2. Population-Resource Relationship:

- 2.1. World distribution of population; Factors affecting population distribution.
- 2.2. World population growth and density.
- 2.3. Population-Resource Regions of the world.
- 2.4. Malthus theory of Population.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Population dynamics:

- 3.1. Determinants, measures and theories of fertility
- 3.2. Determinants and measures of Mortality and Morbidity
- 3.3. Determinants, measures and theories of Migration
- 3.4. Demographic transition theory

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Population problems, Prospects and Policies:

- 4.1. Changing Population composition (age, sex & occupation) and its socioeconomic implications.
- 4.2. Population problems of developed and developing countries.
- 4.3. Causes and consequences of Aging.
- 4.4. Population policies of developed and developing countries with a special focus on India.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Barrett H. R., 1995: *Population Geography*, Oliver and Boyd.
 2. Bhende A. and Kanitkar T., 2000: *Principles of Population Studies*, Himalaya Publishing House.
 3. Chandna R. C. and Sidhu M. S., 1980: *An Introduction to Population Geography*, Kalyani Publishers.
 4. Clarke J. I., 1965: *Population Geography*, Pergamon Press, Oxford.
 5. Hassan, M.I. 2020 : *Population Geography: A Systematic Exposition*, Routledge, New York.
 6. Jones, H. R., 2000: *Population Geography*, 3rd ed. Paul Chapman, London.
 7. Lutz W., Warren C. S. and Scherbov S., 2004: *The End of the World Population Growth in the 21st Century*, Earthscan
 8. Newbold K. B., 2009: *Population Geography: Tools and Issues*, Rowman and Littlefield Publishers.
 9. Pacione M., 1986: *Population Geography: Progress and Prospect*, Taylor and Francis.
 10. Wilson M. G. A., 1968: *Population Geography*, Nelson.
 11. Panda B P (1988): *Janasankya Bhugol*, M P Hindi Granth Academy, Bhopal
 12. Maurya S D (2009) *Jansankya Bhugol*, Sharda Putak Bhawan, Allahabad
 13. Chandna, R C (2006), *Jansankhya Bhugol*, Kalyani Publishers, Delhi
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GEO – 104: Geography of India

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic understanding about India would be helpful.

Aim of the Course:

is to provide essential and advanced understanding of Geography of India that could be used in analyses during simultaneous modules.

Course Outcomes:

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

- I. Gain comprehensive understanding of the physical geographical features of India including physiography and climate.
 - II. Evaluate human geographical features of India including demographic characteristics, population distribution, rural and urbanization trends, and socio-cultural diversity of India.
 - III. Investigate the economic activities, resource base, industries, agriculture, trade networks, and development challenges in different regions of India.
 - IV. Discuss the role spatial planning, urban growth, infrastructure development, and regional disparities in India.
-

Course Contents:

Unit 1. Physiographic and climatic characteristics of India

- 1.1. Physiographic division of India;
- 1.2. Soil types and distribution;
- 1.3. Vegetation - types and distribution in India;
- 1.4. Climatic characteristics of India, Monsoon mechanism in India

(Covers OBE level – Remember and Understand)

Unit 2. Social composition of India

- 2.1. Population: distribution and growth and associated basic characteristics;
- 2.2. Social composition of India: Religion, Language; Tribe; Caste system in India
- 2.3. Settlement Pattern – urban and rural

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Mineral resources and industries in India

- 3.1. Distribution, pattern and utilization of coal, Iron ore, Bauxite, Petroleum, Natural gas
- 3.2. Major Industries - Iron and Steel, Aluminum Industry, Automobile, Cotton Textile Industry

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Agricultural resources in India

- 4.1. Production and distribution of rice, Wheat, Cotton;
- 4.2. Agro-climatic region of India

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List -

1. Deshpande C. D., 1992: India: A Regional Interpretation, ICSSR, New Delhi.
 2. Johnson, B. L. C., ed. 2001. Geographical Dictionary of India. Vision Books, New Delhi.
 3. Mandal R. B. (ed.), 1990: Patterns of Regional Geography – An Intentional Perspective. Vol. 3 – Indian Perspective.
 4. Sdyasuk Galina and P Sengupta (1967): Economic Regionalisation of India, Census of India
 5. Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ., New Delhi.
 6. Singh R. L., 1971: India: A Regional Geography, National Geographical Society of India.
 7. Singh, Jagdish 2003: India - A Comprehensive & Systematic Geography, Gyanodaya Prakashan, Gorakhpur.
 8. Spate O. H. K. and Learmonth A. T. A., 1967: India and Pakistan: A General and Regional Geography, Methuen.
 9. Tirtha, Ranjit 2002: Geography of India, Rawat Publs., Jaipur & New Delhi.
 10. Pathak, C. R. 2003: Spatial Structure and Processes of Development in India. Regional Science Assoc., Kolkata.
 11. Tiwari, R.C. (2007) Geography of India. Prayag Pustak Bhawan, Allahabad
 12. Sharma, T.C. (2013) Economic Geography of India. Rawat Publication, Jaipur
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GEO – 105: Cartographic Techniques (Practical)

Credit = 4

F.M. = 100 [20 (Project Work) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic understanding of mapping would be helpful.

Aim of the Course:

is to provide essential cartographic skills to the students and educate them in effective map-making as per the requirement.

Course Outcomes:

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

- I. Understand the fundamental principles of Cartography and Map Design and Layout to create aesthetically pleasing and effective maps.
 - II. Expert in managing geographic data and cartographic process to create different types of maps using different geographic data using various techniques.
 - III. Enhance Visualisation as well as Spatial Thinking skills to visualize and analyse spatial relationships and patterns using maps and spatial data.
 - IV. Develop the ability to effectively communicate through maps and interpret maps critically.
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Course Contents:

Unit 1. Overview of Cartography

- 1.1. Need and scientific basis of map-making (Cartography); History of Cartography
- 1.2. Types of maps – brief review of general-purpose map and thematic maps (Choropleth, Isopleth, Chorochromatic, proportional symbol, dot maps including multiple dots, flow maps, and cartograms);
- 1.3. Basic elements of map
- 1.4. Use of Diagrams in Geography Use of Diagrams in Geography- Climograph, Hydergraph, and Ergograph

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Fundamentals of Map-making

- 2.1. The reference system – Geographic Coordinate system; Datum;
- 2.2. Map projections: need, properties (four distortions –direction, distance, shape and size) and classification;
- 2.3. Key projections (brief review): Conical projection (one standard & two standard parallels), Cylindrical Projection (Equal Area), Universal Transverse Mercator’s projection (UTM).

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Designing the map

- 3.1. Preparation before mapping: Audience, medium and purpose of the map; Steps in map production;
- 3.2. Basic elements of map: Major (main body of map), Marginal information (Graticules and Grids, legend/index, title, north arrow, scale, labels and map specifications)
- 3.3. Design principles: hierarchy and balance
- 3.4. Symbolization of data (Quantitative and Qualitative) using key components –
 - 3.4.1. Geometry (Point, line and Area) and
 - 3.4.2. Visual Variables (Shape, size, Hue and Value)
- 3.5. Final map layout: Cartographic considerations (placing major and minor components on map)

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 4. Map Interpretation

- 4.1. Morphometric Analysis: Stream order, Sinuosity Index and Bifurcation Ratio; Drainage Density
- 4.2. Topographic & Weather Maps interpretation

(Covers OBE level – Remember, Understand and Apply)

Record & Viva would carry 20 % of marks of Total

Reading List

1. Anson R. and Ormelling F. J., 1994: *International Cartographic Association: Basic of Cartographic Vol.* Pregmen Press.
2. Gupta K. K. and Tyagi V. C., 1992: *Working with Maps*, Survey of India, DST, New Delhi.
3. Kraak M.-J. and Ormeling F., 2003, 2020: *Cartography: Visualization of Geo-Spatial Data*, Prentice-Hall.
4. Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
5. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
6. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
7. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
8. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
9. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
10. Bhopal Singh R L and Dutta P K (2012) *Prayogatama Bhugol*, Central Book Depot, Allahabad

Online Resource:

1. Commonwealth of Australia on behalf of ICSM, 2021. *Fundamental of Mapping* [online]. Available at - <https://www.icsm.gov.au/education/fundamentals-mapping> [Accessed on: 11/06/2021]
 2. Gimond, Manuel, 2021. *Intro to GIS and Spatial Analysis* [online]. Available at - <https://mgimond.github.io/Spatial/index.html> [Accessed on: 11/06/2021]
 3. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
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SEMESTER - II

GEO – 201: Climatology

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of high school physics and math

Aim of the Course:

It aims to provide students with an integrated knowledge on the Earth's climate, understanding of physical climate processes and principles and laws that govern climate.

Course Outcomes:

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

- I. List the composition and structure of atmosphere; describe insolation and heat budget; explain the greenhouse effect, relate insolation and heat budget of an area.
 - II. Tell reasons of spatial variation in temperature on earth surface, explain the reason of thermal inversion, apply the concept of thermal inversion for solving air pollution; apply the concept of insolation to temperature variations and analyze its impact on atmospheric variables like pressure and wind at different spatial scale.
 - III. Relate heat and water content through atmospheric process of evaporation, condensation, cloud formation; apply the concept of saturation and dew point in in humidity, compare the different types of humidity, classify and distinguish rain causing clouds and precipitation and rainfall.
 - IV. Outline the different types of airmass; understand and compare the development and effect of extreme weather condition like cyclone, front; Appraise the use of different climate classification system
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Course Contents:

Unit 1. Earth's atmosphere and heat budget

- 1.1 Composition & Structure of Atmosphere; Chemical Composition of Atmosphere- Homosphere & Heterosphere
- 1.2 Insolation and Factors affecting distribution of insolation;
- 1.3 Heat Budget of Earth

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Temperature variation and its effect

- 2.1 Temperature and factors controlling distribution of temperature; Horizontal & Vertical Distribution of temperature, Cause and effect Temperature Inversion
- 2.2 Atmospheric pressure and its measurement, Horizontal distribution of pressure & pressure belt
- 2.3 Wind and its types, Planetary Wind, Effect of Coriolis force on wind, Jet stream, Monsoon.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Atmospheric water

- 3.1 States of water and latent heat, and Evaporation; Condensation;
- 3.2 Water Vapour - concept of saturation, Dew point, Humidity measurement, Absolute Humidity, relative Humidity, Specific Humidity
- 3.3 Classification of Cloud; Forms of precipitation; Types of Rainfall and its measurement

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Applied Geomorphology in –

- 4.1 Meaning, properties and source of Air mass
- 4.2 Fronts, its Classification, development and effect
- 4.3 Origin, characteristics and effects of Tropical and Extra Tropical Cyclone
- 4.4 Climate classification basic, Koeppen's and Thornthwaite's Classification of Climate

(Covers OBE level – Remember, Understand, Apply and Analyse and evaluate)

Reading List

1. Barry R. G. and Carleton A. M., 2001: Synoptic and Dynamic Climatology, Routledge, UK.
2. Barry R. G. and Corley R. J., 1998: Atmosphere, Weather and Climate, Routledge, New York.
3. Critchfield H. J., 1987: General Climatology, Prentice-Hall of India, New Delhi
4. Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey.
5. Oliver J. E. and Hidore J. J., 2002: Climatology: An Atmospheric Science, Pearson Education, New Delhi.
6. Trewartha G. T. and Horne L. H., 1980: An Introduction to Climate, McGraw-Hill.
7. Lal, D S (2006): Climatology, Sharda Pustak Bhawan, Allahabad
8. Vatal, M (1986): Bhautik Bhugol, Central Book Depot, Allahabad
9. Singh, S (2009): Climatology, Prayag Pustak Bhawan, Allahabad

GEO – 202: Economic Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of economic development and natural resources

Aim of the Course:

to provide a critical understanding of resource available to be used by humans and how they can be conserved and managed sustainably.

Course Outcomes:

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

- I. Gain comprehensive understanding of the fundamentals of Economic and Resource Geography and debate surrounding it.
 - II. Investigate spatial patterns of Economic development by examining the factors affecting and concepts of economic development as well as assessing theories for growth and localisation.
 - III. Evaluate different resource geography models and appraise, relate, compare, and differentiate them particularly the models related to natural resources
 - IV. Appraise and Interpret different resources in terms of their conservation and management and summarise their challenges and sustainability
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Course Contents:

Unit 1. Basics of Resource Geography

- 1.1. Nature, Scope and Significance of Economic Geography
- 1.2. Nature, Scope and Significance of Resource Geography;
- 1.3. Definition and Concept of Resources; Classification of Resources.
- 1.4. Concept and types of economic activities;

(Covers OBE level – Remember and Understand)

Unit 2. Spatial patterns of Economic development

- 2.1. Factors affecting location of economic activities-Von Thunen's Agricultural Location Theory; Industrial Location Theory of Weber and Smith.
- 2.2. Economic Development: Concept and Indicators; Global Patterns of development- Classification of countries.
- 2.3. Rostow's stage model of economic growth
- 2.4. Environment vs Development Debate

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Natural Resources: Use, Misuse and Future prospects

- 3.1. Models of Natural Resource Processes: Zimmermann's Primitive and Advance Models of Natural Resource Process, Kirk's Decision Model, Brookfield System Model.
- 3.2. Soil Resource; Water Resource; Forest Resource and Mineral Resources;
- 3.3. Impact of globalization on resources; Future Prospects of Natural Resources

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Conservation and Management of Natural Resources

- 4.1. Meaning and Concept of Conservation of Natural Resources;
- 4.2. Models of resource management: Biophysical; Economic; Cultural models (Mitchell 1980)
- 4.3. Resource Conservation and Management Methods of Natural Resources- Soil Resource, Water Resource, and Forest Resource;
- 4.4. Sustainable Natural resource Management – History; Goals (emphasizing SDGs);
- 4.5. Problems of Natural Resource Management in India.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Reading List

1. Alexander J. W., 1963: *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Bagchi-Sen S. and Smith H. L., 2006: *Economic Geography: Past, Present and Future*, Taylor and Francis.
3. Coe N. M., Kelly P. F. and Yeung H. W., 2007: *Economic Geography: A Contemporary Introduction*, Wiley-Blackwell.
4. Eliot Hurst, M.E. (1972) *A Geography of Economic Behaviour: An Introduction*, Duxbury Press, California.
5. Gautam, Alka, (2013): *Geography of Resources*, Sharda Pustak Bhawan, Allahabad.
6. Guha, J.L. and P.R.Chattroj (1994) *Economic geography- A Study of Resources*, The World Press Pvt. Ltd. Calcutta
7. Gurjar, R.K. and Jat, B.C. (2012): *Sansadhan Bhugol*, Panchsheel Prakashan, Jaipur.
8. Haroon Mohamad. (2007) *Geography of Resources*, Vasundhara Parkashan, Gorakhpur (Hindi Edition)
9. Martin, R.H. and F.L. Warren. (1959) *Natural Resources*. McGraw Hill Book Co. London.
10. Maurya, S.D. (2015) *Economic Geography*. Parwalika Publications, Allahabad (Hindi Edition).
11. Mitchell B., 1997: *Resource and Environmental Management*, Longman Harlow, England.
12. Mitra, A. (2000): *Resource Studies*; Shridhar Publiders., Kolkata.
13. Negi, B.S.(2000) *Geography of Resources*, Kedar Nath and Ram Nath, Meerut
14. Owen, Oliver, S.(1971) *Natural Resource Conservation : A Ecological Approach*. McMillion New Delhi.
15. Ramesh, A. (1984) *Resource Geography (Ed.) R.P. Misra, Contribution to Indian Geography, Vol 5*, Heritage Publishers, New Delhi.
16. Singh, A and Raja, M. (1982) *Geography of Resources and Conservation (Hindi Edition)* Pargati Parkashan, Meerut.

Online Resources

1. Mitchell, Bruce, 1980. *Models of resource management*, Sage Publication
2. United Nations, 2021. *Sustainable Development Goals* [online]. Available at: <https://sdgs.un.org/goals> [Accessed on 14th June 2021]

GEO – 203: Statistical Methods in Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of statistics

Aim of the Course:

is to provide an understanding on the statistical interpretation of geographical data to unfurl geographical patterns and relationships and enable students to derive a meaningful inference from the different dimensions of geographical studies.

Course Outcomes:

After the completion of the course, student will be able to

- I. Show proficiency in describing and interpreting geographical data and apply basic statistical skills to sort data and Compare different statistical methods and select the apt tool based on the nature of data and purpose of study.
 - II. Explain basic descriptive statistics to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data in geographical problems.
 - III. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting; Examine Test of Hypothesis for a population parameter; Demonstrate the practice of statistical thinking by taking a real-life problem; evaluate whether the procedure can be safely applied, explain the implications of statistical outcomes on the geographical study at-hand
 - IV. Demonstrate ability to write reports of the results of statistical analyses (both descriptive and inferential) of geographic questions/problems/issues; Develop statistical software skills to solve geographical issues.
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Course Contents:

Unit 1: Data and data sampling

- 1.4 Types of data, scale of data measurement, data presentation, Selection of class interval for mapping.
- 1.5 Sampling techniques for geographical analysis; sample units and design, sampling frame and procedures, standard error and sample size, testing the adequacy of samples.
- 1.6 Scaling techniques-rank score; Weighted score; Nearest-neighbour analysis.
- 1.7 Drawing of histogram, Frequency curve, Frequency polygon, Bar diagram, Ogive using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 2: Measures of central tendency and dispersion

- 2.4 Measurement of Mean, Median and mode, Quartile.

- 2.5 Measurement of Range, quartile deviation, mean deviation,
- 2.6 Measurement of Standard deviation; coefficient of variation, Lorenz Curve and Gini's Coefficient; location Quotient.
- 2.7 Graphical estimation and presentation of central tendency and dispersion using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 3: Correlation and regression

- 3.1 Forms of relation and measuring the strength of association, use of scatter diagram; Spearman's Rank Difference and Karl Pearson's Product Moment Correlation Coefficients, Coefficient of determination.
- 3.2 Regression analysis- regression equations, construction of regression line-interpolation, prediction, explanation; residual-statistical tests of significance of the estimates; computation of residuals
- 3.3 Drawing of scatter plot, Estimation of coefficient of correlation, coefficient of determination, fitting of regression line using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. ANOVA and Hypothesis testing

- 4.5 Hypothesis Testing: Needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures:
- 4.6 Contingency tables, Chi-square test, t-test, Analysis of Variance (ANOVA) and its estimation using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

1. David, U. (1981): Introductory Spatial Analysis, Methuen, London.
2. Ebdon, D. (1983): Statistics in Geography: A Practical Approach, Blackwell, London.
3. Gregory, S. (1978): Statistical Methods and the Geographer (4th Edition), Longman, London.
4. Gupta, S.P. (2010): Statistical Methods, Sultan Chand and Sons, Latest Edition
5. Hammond, R. and McCullagh, P.S. (1974), Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.
6. John P. Cole and Cuchlaine, King, A. M. (1968): Quantitative Geography, Wiley, London
7. Mathews, J.A. (1987): Quantitative and Statistical Approaches to Geography, Practical Manual, Pergamon, Oxford.
8. Pal, S.K. (1998): Statistics for Geoscientists; Techniques and Applications, Concept Publishing, New Delhi.
9. Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient

GEO – 204: Fundamentals of Remote Sensing and GIS

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Remote Sensing and GIS

Aim of the Course:

is to train students in relevant topics of Remote Sensing and GIS covering its theoretical and practical aspects in order to use the understanding of basic principles of Remote Sensing, satellite image processing, Geographical Information System and its application to natural resource management.

Course Outcomes:

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

- I. To learn the basic concepts of remote sensing, understand the fundamental concepts of satellites, platforms, resolution, sensors and its processes
 - II. To learn the concept of visual image interpretation and digital image processing
 - III. To understand the application of remote sensing and GIS in natural resource management
 - IV. Explore a range of spatial analysis techniques and tools available in GIS and Remote sensing integrated in GIS to solve real-world spatial problems and support decision-making processes.
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Course Contents:

Unit 1. Principles of Remote Sensing, Satellite and Sensors

- 1.1. Introduction to Remote Sensing: Fundamental Principle of Remote Sensing; Types of Remote Sensing; Advantages and limitations of Remote Sensing
- 1.2. Electromagnetic Radiation (EMR); Electromagnetic Spectrum; Energy interacts with the Atmosphere; Energy interacts with the Earth Surface; Spectral Reflectance Curve
- 1.3. Platforms: Ground based platform; Aerial platform; Satellite platform
- 1.4. Satellite Orbits: Geostationary Satellites; Sun-synchronous Satellites
- 1.5. Resolution: Spatial Resolution; Radiometric Resolution; Spectral Resolution; Temporal Resolution
- 1.6. Multispectral Scanning: Across Track Scanning; Along Track Scanning
- 1.7. Data Reception, Transmission and Processing

(Covers OBE level – Remember, Understand and Analyse)

Unit 2. Image Interpretation and Digital Image Processing

- 2.1. Visual Image Interpretation; Elements of Visual Image Interpretation
- 2.2. Image Pre-processing: Radiometric correction; Geometric correction; Atmospheric correction
- 2.3. Image Enhancement: Filtering; Band Ratioing, Principal Component Analysis
- 2.4. Image Classification: Supervised Classification; Unsupervised Classification

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 3. Remote Sensing Applications

- 3.1. Landuse and Landcover Mapping; Urban Sprawl Mapping
- 3.2. Agriculture: Crop Type Mapping and Inventory; Crop Monitoring and Damage Assessment
- 3.3. Forestry: Deforestation, Afforestation Mapping; Species Identification and Mapping; Forest Fire Monitoring and Mapping
- 3.4. Hydrological Mapping: Ocean and Coastal Area Monitoring and Mapping
- 3.5. Geology: Geological Mapping

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit-4. Introduction to Geographical Information System (GIS)

- 4.1. Definition of GIS; Components of GIS; Spatial and Non-Spatial Data; Digitization
- 4.2. Raster and Vector Data; Spatial Analysis; Spatial Statistics; GIS Applications
- 4.3. Global Positioning System (GPS): Concepts; GPS Positioning Types; GPS Systems
- 4.5. Multi Criteria Decision Making

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Reading List

1. Joseph, G. (2004) Fundamentals of Remote Sensing, Universities Press Pvt. Ltd
 2. Lillesand, T.M. and Kiefer, R.W. (2002) Remote Sensing and Image Interpretation, John Wiley and Sons, New Delhi
 3. Jensen, J.R. (2003) Remote Sensing of Environment: An Earth Resource Perspective, Pearson Education Pvt. Ltd
 4. Haywood, L. Comelius, S. and S, Carver. (1988) An introduction to Geographical information system, Addison Willey, New York
 5. Chrisman, N.R. (1997) Remote sensing and Geographical information systems
 6. Sabbins, F. F, (1987) Remote sensing: principles and interpretations, W.H. Freeman and Co, New York
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GEO – 205: Remote Sensing and Geographical Information System Applications (Practical)

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Remote Sensing and GIS

Aim of the Course:

is to train students in relevant topics of Remote Sensing and GIS covering practical aspects in order to use the understanding of basic principles of Remote Sensing, satellite image processing, Geographical Information System and its application to natural resource management.

Course Outcomes:

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

- I. Overall understanding of potential of Remote Sensing, GIS and GPS
- II. Understanding of image interpretation and digital image processing
- III. Exploring Remote Sensing applications in various domains of Natural Resource Management
- IV. Applying GIS analysis workflow and integrated applications in various domains of Natural Resource Management

Course Contents:

Unit 1. Basics of Remote Sensing

- 1.1. Display of satellite images; Import and export of file; Layer stacking of image; Geo-referencing (map to image and image to map); Subset of image using AOI; Mosaic of images
- 1.2. Radiometric correction of image; Geometric correction of image
- 1.3. Masking of image; Re-project of image

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 2. Digital Image Processing

- 2.1. Visual interpretation of satellite images
- 2.2. Image Enhancement: Radiometric Enhancement; Spectral Enhancement; Image Filtering; Band Ratioing, Principal Component Analysis
- 2.3. Unsupervised Classification of Image (K-Mean and Isodata); Supervised Classification of Image (Maximum Likelihood and Minimum Distance to Mean); Accuracy Assessment; Model making

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 3. Remote Sensing Application in Natural Resource Management

- 3.1. Landuse and landcover classification

- 3.2. Forest Cover Classification and area estimation
- 3.3. Agriculture mapping and acreage area estimation
- 3.4. Forest Fire and Burnt Area Mapping
- 3.5. Flood Delineation and Mapping
- 3.6. Coastal Erosion Mapping
- 3.7. Urban Sprawl Mapping

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 4. Geographical Information System (GIS)

- 4.1. Geographic Data, Input, Storage and Editing: Spatial data and Non-spatial data integration; Editing of data; Building of topology
- 4.2. Digitization: point, line and polygon; storage and manipulation of GIS data bases; vector and raster-based models; presentation of GIS output.
- 4.3. Coordinate systems and map projections.
- 4.4. Multi Criteria Decision Making.

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Reading List

- 1. NY. Burrough P.A. (1986) Principles of GIS for land assessment. University press London
 - 2. Burrough, P.A. and McDonnell, R.A. (1998) *Principles of Geographic Information Systems*, Oxford University Press
 - 3. Chang, K-t. (2006) *Introduction to Geographic Information Systems*, Tata McGraw-Hill
 - 4. DeMers, M. (2009) *Fundamentals of Geographic Information Systems*, 4th Edition, John Wiley & Sons.
 - 5. Heywood, I. Cornelius, S. Carver, S. (2011) *An Introduction to Geographic Information Systems*, 4th Edition, Pearson Education.
 - 6. Jensen, J.R. (2006) *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd Edition, Pearson Education
 - 7. Joseph, G. (2005) *Fundamentals of Remote Sensing*, Orient Blackswan.
 - 8. Lillesand, T.M., Kiefer, R.W. and Chipman, J.W. (2004) *Remote Sensing and Image Interpretation*, 5th Edition, Wiley.
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INTER DISCIPLINE SPECIFIC ELECTIVE (IDSE)

GEO (DSE) – 206 [A]: Geography of Tourism

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Familiarity with Tourism.

Aim of the Course:

to examine geographies of tourism on different scales (global, national and local) along with their impacts (economic, social, cultural, political, and environmental).

Course Outcomes:

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

- I. Define, describe and relate the basics characteristics and trends of tourism covering India and world
 - II. Review, classify and distinguish classification and characteristics of tourism
 - III. Relate and Analyze spatial variation in tourism
 - IV. Evaluate opportunities, impact and management of tourism
-

Course Contents:

Unit 1. Basics of Tourism

- 1.1. Tourism: Definition, nature and scope;
- 1.2. Factors affecting tourists flow and movements;
- 1.3. Recent trends in tourists' flow and movements;
- 1.4. Traditional and recent tourist destinations of India and world

(Covers OBE level – Remember)

Unit 2. Classification and characteristics of tourism

- 2.1. Types of tourism;
- 2.2. Tourism demand and supply;
- 2.3. Tourists motivations - recent trends and role of social media

(Covers OBE level – Remember and Understand)

Unit 3. Spatial variation in tourism

- 3.1. Factors affecting tourism development across countries;
- 3.2. Major and minor tourism generating countries, and their tourism policies;

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Tourism – Opportunities, Impact, management

- 4.1. Tourism opportunities (e.g. eco-tourism, mining tourism, adventure tourism, home stay local tourism)

- 4.2. Impacts of tourism on economies, societies, and environments;
- 4.3. Planning and management issues associated with tourism.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Reading List -

1. Dhar, P.N. (2006) International Tourism: Emerging Challenges and Future Prospects. Kanishka, New Delhi.
 2. Hall, M. and Stephen, P. (2006) Geography of Tourism and Recreation – Environment, Place and Space, Routledge, London.
 3. Kamra, K. K. and Chand, M. (2007) Basics of Tourism: Theory, Operation and Practise, Kanishka Publishers, Pune.
 4. Page, S. J. (2011) Tourism Management: An Introduction, Butterworth-Heinemann- USA. Chapter 2.
 5. Raj, R. and Nigel, D. (2007) Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective by, CABI, Cambridge, USA, www.cabi.org.
 6. Tourism Recreation and Research Journal, Center for Tourism Research and Development, Lucknow
 7. Singh Jagbir (2014) “Eco-Tourism” Published by - I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).
-

GEO (DSE) – 206 [B]: Geography of Odisha

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Geography of Odisha

Aim of the Course:

is to train students in relevant topics of Geography of Odisha covering theoretical aspects in order to use the understanding of basic knowledge about Geography of Odisha and its Natural Resource Management.

Course Outcomes:

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

- I. Review the basic knowledge about Odisha Geography such as Physiography, Climate, Soil, Vegetation, Drainage System, Natural Hazards, Coastal Erosion
 - II. Explore the types of crops and its production, agricultural problems of Odisha
 - III. Evaluate the study of demography, Transportation and Tourism of Odisha
 - IV. Discuss spatial planning principles, land use policies, infrastructure development, and urban growth management strategies in Odisha
-

Course Contents:

Unit 1. Physiography of Odisha

- 1.1. Location
- 1.2. Physiography Divisions
- 1.3. Geology
- 1.4. Drainage Systems
- 1.5. Natural Hazards
- 1.6. Coastal Erosion

(Covers OBE level – Remember, Understand and Analyze)

Unit 2. Climate, Soil and Vegetation of Odisha

- 2.1. Climate
- 2.2. Soil
- 2.3. Natural Vegetation

(Covers OBE level – Remember, Understand and Analyze)

Unit 3. Agricultural Crops of Odisha

- 3.1. Production and distribution of Rice, Pulses, Oilseed
- 3.2. Agricultural Problems in Odisha

(Covers OBE level – Remember, Understand and Analyze)

Unit 4. Demography, Transportation and Tourist Spots of Odisha

- 4.1. Population Distribution; Population Growth
- 4.2. Urban Growth
- 4.3. Development of Roadways
- 4.4. Major Religious, Cultural and Natural Tourist Spots in Odisha: Puri, Konark, Similipal and Huma

(Covers OBE level – Remember, Understand and Analyse)

Reading List

1. Sinha, B.N. (2014) Geography of Odisha, National Book Trust Publication.
 2. Roy, G.C. (2006) Geography of Odisha, Kalyani Publication.
-

GEO (DSE) – 206 [C]: Political Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide a thorough understanding of role of geography in the political evolution of the world.

Course Outcomes:

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

- I. Recognize and state basic concepts of Political Geography
 - II. Understand, discuss and describe fundamental concepts involved in Political Geography
 - III. Review, understand, discuss and analyse global strategies and implications
 - IV. Review, understand, discuss and describe political geography of India
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Course Contents:

Unit 1. Introduction to Political Geography

- 1.1. Nature and Scope, Development of Political Geography;
- 1.2. Approaches to the Study of Political Geography with special reference to German, British and American Schools;
- 1.3. The State and Nation; Anatomy of States

(Covers OBE level – Remember)

Unit 2. Fundamentals -

- 2.1. Geographical perspectives of formation of State, Nation and Nation-State;
- 2.2. Core and Peripheral areas, Capitals, Frontiers and Boundaries, Buffer zones, Buffer states and Land locked areas;
- 2.3. Core Areas and Capitals Frontiers and Boundaries
- 2.4. Colonialism, decolonialism and neo-colonialism;

(Covers OBE level – Remember and Understand)

Unit 3. Global Strategies

- 3.1. Heartland and Rimland: Geo-static ideas of Mackinder and Spykeman, Strategic view of Deseveresky, their contemporary relevance; Changing pattern of Superpower;
- 3.2. Politics of world resources; Political and Economic blocks, Political Geography of foreign trade;
- 3.3. Impress of Politics upon the environment frameworks (such was Sustainable Development Goals)

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Political Geography in India

- 4.1. Partition of India and its geopolitical implication;
- 4.2. Organization of Indian States since independence

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Agnew J., 2002: *Making Political Geography*, Arnold.
 2. Agnew J., Mitchell K. and Toal G., 2003: *A Companion to Political Geography*, Blackwell.
 3. Busted, N.A. : *Developments in Political Geography*.
 4. Chauhan, P.R. : *Rajnitik Bhoogol*, Gorakhpur.
 5. Cox K. R., Low M. and Robinson J., 2008: *The Sage Handbook of Political Geography*, Sage Publications.
 6. Cox K., 2002: *Political Geography: Territory, State and Society*, Wiley-Blackwell.
 7. Dixit, R.D. : *Political Geography : A Contemporary Perspective*, New Delhi.
 8. Dwivedi, R.L. : *Political Geography*, Allahabad.
 9. Gallaher C., et al, 2009: *Key Concepts in Political Geography*, Sage Publications.
 10. Glassner M., 1993: *Political Geography*, Wiley.
 11. Glassner, M.I. & Blij H.J.De : *Systemic Political Geography*, New York
 12. Jones M., 2004: *An Introduction to Political Geography: Space, Place and Politics*, Routledge .
 13. Mathur H M and M M Cernea (eds.) *Development, Displacement and Resettlement – Focus on Asian Experience*, Vikas, Delhi.
 14. Kasperson, R.E. & Minghi, J.V. : *Structure of Political Geography*, London.
 15. Painter J. and Jeffrey A., 2009: *Political Geography*, Sage Publications.
 16. Shrivastava, R.M. – *Rajnitik Bhoogol*, Allahabad.
 17. Taylor P. and Flint C., 2000: *Political Geography*, Pearson Education.
 18. Verma M K (2004): *Development, Displacement and Resettlement*, Rawat Publications, Delhi
 19. Hodder Dick, Sarah J Llyod and Keith S McLachlan (1998), *Land Locked States of Africa and Asia* (vo.2), Frank Cass
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SEMESTER - III

GEO – 301: Oceanography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Oceanography

Aim of the Course:

is to train students in relevant topics of Oceanography covering its theoretical and practical aspects in order to understand different process in ocean water and its related studies.

Course Outcomes:

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

- I. Review, interpret and describe different perspectives of relief features of ocean basins.
 - II. Review, interpret, discuss, relate and critic different fundamental concepts of ocean temperature and salinity and its processes
 - III. Identify the concept of understanding in oceanographic studies developed in Unit 2, 3 and 4
 - IV. Review, interpret, discuss, relate and critic different fundamental concepts and perspectives of Oceanography as well as Oceanic environment
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Course Contents:

Unit 1. Perspectives in Oceanography

- 1.1. Introduction to ocean and its relief features: A general view of ocean; Continental Shelf; Continental Slope; Deep Sea Plain; Mid Oceanic Ridges; Submarine Canyons; Sea Mounts; Sea Guyots
- 1.2. Bottom Relief of Ocean: Atlantic Ocean; Pacific Ocean; Indian Ocean
- 1.3. Ocean-Atmosphere Interaction: significance of ocean atmosphere interaction; coupling phenomenon; concept of boundary layers; ocean –atmosphere interaction near the tropics

(Covers OBE level – Remember, Understand and Analyse)

Unit 2. Fundamental Concepts – I

- 2.1. Ocean Temperature and Salinity: Factors affecting horizontal distribution of temperature of ocean water; Controlling factors of the density of ocean water
- 2.2. Factors controlling distribution of salinity; Horizontal and Vertical distribution of Salinity

(Covers OBE level – Remember, Understand, Analyse and Apply)

Unit 3. Fundamental Concepts – II

- 4.1. Tide: Concept of Tides; Types of Tide; Progressive Wave Theory on Tide; Equilibrium Theory on Tide
- 4.2. Ocean Current: Concept of ocean current; Factors associated with ocean current; Currents of Atlantic Ocean; Currents of Pacific Ocean; Currents of Indian Ocean
- 4.3. Concept of El-Nino; La-Nino effects

(Covers OBE level – Remember, Understand, Analyse and Apply)

Unit 4. Perspectives in

- 4.1. Coral Reef: Coral reef; Types of Coral reef; Ideal Condition for the growth of Coral reef
- 4.2. Theory of Coral reef: Subsidence theory of Darwin; Standstill theory of Murray; Coral Bleaching; Marine resource and its types

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Reading List

- 1. Davis, R.J.A. (1986) *Oceanography: An Introduction to Marine Environments*, Winc-Brown Publication, Iowa
 - 2. Sharma, R.C. and Vatal, M. (2018) *Oceanography*: Surjeet Publications, New Delhi
 - 3. Lal, D.S. (2008) *Climatology and Oceanography*, Sharada Pustak Bhawan, Allahabad, 2008
 - 4. Garrison, T.S. (2015) *Oceanography: An Invitation to Marine Science*, Cengage Publication
 - 5. Siddartha, K. (2016) *Oceanography, Kitab Mahal Publication*
 - 6. Singh, S. (2009) *Physical Geography*, Pravalika Publications, Allahabad
 - 7. Khullar, D.R. (2012) *Physical Geography*, Kalyani Publishers, New Delhi
-

GEO – 302: Social and Cultural Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide essential understanding of the social and cultural side of Geography with emphasis on India.

Course Outcomes:

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

- I. Recognise, define and describe the evolution and relevance of Social Geography
 - II. Identify, summarise and compute elements of Social Geography, particularly for India
 - III. Recognise, define and describe the evolution and relevance of Cultural Geography
 - IV. Identify, summarise and compute elements of Cultural Geography with particular emphasis on India
-

Course Contents:

Unit 1. Social Geography- evolution and relevance

- 1.1. Definition: Nature and Scope and evolution of Social Geography;
- 1.2. Philosophical Bases of Social Geography (Positivism, Structuralism);
- 1.3. Social Structure & Social Processes;
- 1.4. Concept of Social Space;

(Covers OBE level – Remember and Understand)

Unit 2. Elements of Social Geography (with emphasis on India)

- 2.1. Ethnicity, Tribe, Dialect, Language, Caste & Religion;
- 2.2. Socio-Cultural Regions of India;
- 2.3. Linguistic Elements in India.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Cultural Geography-evolution and relevance

- 3.1. Definition: Nature and Scope and evolution of Cultural Geography;
- 3.2. Culture: Definition, Elements & Components;
- 3.3. Themes and Concepts in Cultural Geography: Culture Area, Cultural Region, Cultural Diffusion and Assimilation, Cultural ecology, Cultural Interaction, Cultural Landscape
- 3.4. Concepts of Culture –Traits, Diffusion, Acculturation;

(Covers OBE level – Remember and Understand)

Unit 4. Components of Cultural Geography (with emphasis on India)

- 4.1. Types and Pattern of World Cultural regions;
- 4.2. Language, Religion, Ethnicity;
- 4.3. Cultures and cultural regions in India;
- 4.4. Ethnicities in India

(Covers OBE level – Remember, Understand and Apply)

Reading List

1. Ahmad, A. (1999). Social Geography. Jaipur: Rawat Publications.
 2. Crang, Mike (2013). Cultural Geography. London: Routledge.
 3. Dreze. Jean and A. Sen (2004). An Uncertain Glory: India and its Contradiction. New Delhi: Penguin India
 4. Eyles, John (1979). An Introduction to Social Geography, London: OUP
 5. Mitchell, D. (2000). Cultural Geography: A Critical Introduction, Oxford: Blackwell Publishers Ltd.
 6. Price, M., and M. Lewis (1993). "The Reinvention of Cultural Geography". Annals of the Association of American Geographers, 83 (1):1-17.
 7. Robertson, I. and Richards, P. (2003). (eds.): Studying Cultural Landscapes. London: Arnold
 8. Subbarao, Bendapudi (1958). The Personality of India, Faculty of Arts, Baroda: MS University
 9. Khilnani, Sunil (2004). The Idea of India. Delhi: Penguin India
 10. Thrift, Nigel (2005) Cultural Geography: Critical Concepts in the social Sciences. London: Routledge
-

GEO – 303: Settlement Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide a thorough understanding of settlements across the globe including their importance, trends and growth.

Course Outcomes:

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

- I. Examine basic concepts of Settlement Geography and Explore the historical development of settlements from ancient to modern times
 - II. Understand, discuss and describe fundamentals of Rural and Urban Settlement
 - III. Examining contemporary challenges and issues facing human settlements
 - IV. Encouraging students to critically analyse and evaluate settlement patterns and processes, policies and to develop solutions to real-world settlement-related problems.
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Course Contents:

Unit 1. Introduction to Settlement Geography

- 1.1. Nature, scope, significance and approaches to study Settlement Geography;
- 1.2. Development of Settlement Geography;
- 1.3. Theories of evolution of settlements and Geographical factors affecting growth of settlement distribution;
- 1.4. Types of Settlement: Rural and Urban Rural-urban dichotomy and continuum

(Covers OBE level – Remember)

Unit 2. Rural Settlement

- 2.1. Site, location, types and pattern;
- 2.2. Morphology of rural settlement;
- 2.3. Rural House types: planned and architectural style in different geographical environment;
- 2.4. Types and pattern of rural settlements

(Covers OBE level – Remember and Understand)

Unit 3. Urban Settlement

- 3.1. Origin of the cities: Ancient and Medieval;
- 3.2. Industrial growth and urban expansion;
- 3.3. Functional classification of urban centres: Harris and Nelson
- 3.4. Functional classification of Indian cities: Ashok Mitra and others

(Covers OBE level – Remember, Understand and Apply)

Unit 4. Settlement Hierarchy and Policies

- 4.1. Rural service centre;
- 4.2. Central Place theory (Christaller);
- 4.3. Theory of Losch and its application
- 4.4. Issues and policies of Settlements, settlement planning

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List

1. Ambrose, Peter, Concepts in Geography Vol.-I Settlement Pattern, Longman 1970.
 2. Baskin, C., (Translator), Central Places in Southern Germany, Prentice-Hall Inc.
 3. Fyfe N. R. and Kenny J. T., 2005: *The Urban Geography Reader*, Routledge.
 4. Graham S. and Marvin S., 2001: *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, Routledge.
 5. Hall T., 2006: *Urban Geography*, Taylor and Francis.
 6. Haggett, Peter, Andrew D. Cliff and Allen Frey (editor), *Locational Models* Arnold Heinemann 1979.
 7. King, Leslie, J., *Central Place Theory*, Saga Publications, New Delhi 1986.
 8. Mayer, M. Harold and Clyde F. Kohn (editors), *Readings in Urban Geography*, Central Book Depot, Allahabad 1967.
 9. Nangia, Sudesh, *Delhi Metropolitan Region*, K.B. Publications, New Delhi 1976.
 10. Prakasa, Rao, V.L.S., *Urbanisation in India; Spatial Dimensions*, Concept Publishing Co., New Delhi 1983.
 11. Ramachandran, R., *Urbanisation and Urban Systems in India*, Oxford University Press, New Delhi 1992.
 12. Singh R.L. and Kashi, Nath Singh (editors), *Readings in Rural Settlement Geography*, National Geographical Society of India, Varanasi 1975.
 13. Sinha, VPN, Usha Verma and Anuradha Sahay, *Introduction to Settlement Geography*, Rajesh Publication, 2017. (ISBN 10: 938368433X / ISBN 13: 9789383684335)
 14. Srinivasan, K. and M. Vlassoff, (editors), *Population-Development Nexus in India: Challenges for the New Millennium*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi 2001.
 15. Ucko, M.J., Ruth Tringham and G.W. Dimbleby (editors), *Man, Settlement and Urbanism*, Duckworth 1972.
-

GEO – 304: Remote Sensing and Image Processing

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of remote sensing and statistics

Aim of the Course:

is to introduce fundamental and advanced tools and techniques for satellite image processing on digital platform. This includes basic understanding satellite image to information extraction, information analysis, and processing using various analytical tools.

Course Outcome:

After the completion of the course, student will be able to

- I. Understand the various satellite image format and preparation of colour composite; Analyze and interpret remotely sensed satellite images to understand topographical and cultural variations on the Earth's surface.
 - II. Understand, select and perform the required image pre-processing and processing techniques to improve the visual quality of satellite imagery; compare the different image processing techniques for their suitability for visual extraction of desired information from satellite image
 - III. Understand multi-dimensional feature space of satellite imagery; compare the various classification methods for their suitability for feature extraction; evaluate the accuracy of image classification; perform necessary post editing and estimate classification statistics for a given satellite imagery based geographical study
 - IV. Demonstrate the ability to explain the spatial aspect of geographical issue and deliver a solution to the same using a remote sensing approach.
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Course Contents:

Unit 1: Satellite image and its interpretation

- 1.1 Remote sensing Introduction; Types of resolution; spectral response curve, Public domain satellite data sources, Satellite image format- BIL, BSQ, and BIP Formats.
- 1.2 Image processing display systems, Initial statistical extraction - univariate and multivariate statistics, histogram and its significance in remote sensing data.
- 1.3 Introduction to major software packages; Satellite image interpretation, Generating True, False and Pseudo Colour Composite, Interpretation keys.

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 2: Satellite data Pre-processing

- 2.1 Principles of Digital Image Processing: System Design Considerations; Pre-Processing of Satellite Image
- 2.2 Source and correction of radiometric error, missing scan lines, desk tripping methods

- 2.3 Source and correction of geometric error, geometric correction and registration
- 2.4 Atmospheric correction, illumination and view angle effects.

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 3: Spectral and Spatial enhancement

- 3.1 Introduction- Look-Up Tables, concept of spectral frequency and spatial frequency, point and neighbourhood operation; local and global operations
- 3.2 Spectral enhancement Image reduction, image magnification, contrast enhancement; linear, non-linear enhancement
- 3.3 Spatial enhancement- Filtering–Low pass & High Pass and Directional/Non-Directional; edge detection filter, edge enhancement; linear, nonlinear, Low pass filters, high pass filters, edge detection filter.
- 3.4 Image transformation- Arithmetic operations’-based image transforms, principle component analysis, discriminate analysis, density slicing, Fourier transforms, Fast Fourier frequency domain filters, spectral indices for important earth features,

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Image transformation and Classification

- 4.1 Data Processing techniques, N-Dimensional Scatter plots, Spectral angle mapping, Spectral mixture analysis
- 4.2 Images classification methods, Unsupervised Classification- K-mean clustering, ISODATA; Supervised Classification- training sample selection, minimum distance classifier, parallelepiped classifier, centroid classifier, maximum likelihood method, Hybrid methods and decision - tree classifiers; Use of external data, contextual information, feature - sub-feature study.
- 4.3 Ground truth, Accuracy Assessment; post classification editing; Image Statistics Generation
- 4.4 Change detection - the nature of change detection, change detection algorithms, image differencing, and image rationing and classification comparisons.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

- 1. John R.Jenson, 1986, Introductory digital image processing - A Remote Sensing perspective, , Prentice Hall.
 - 2. Paul M. Mather, 1987, Computer Processing of Remote Sensed Images, John Wiley & Sons.
 - 3. Rosenfeld A. and A.C. Kak, 1976, Digital Picture Processing, New York – Academic Press.
 - 4. Pratt. W.K. , 1976, Digital Image Processing Wiley Intersciences.
 - 5. Allen and Unwin Gibson, P.J. 2000: Digital Image Processing. Routledge Publication.
 - 6. Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
 - 7. Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
 - 8. Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication
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GEO – 305: Field Survey Methods (Practical)

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic understanding of surveying and field requirements would be preferable.

Aim of the Course:

is to provide essential field related skills to the students in order to take cutting-edge research of any problem in real world (preferably local at this education stage).

Course Outcomes:

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

- I. Understand basics of field work and identify field techniques to be used.
 - II. Compare, differentiate and evaluate the data to be collect from field and their method of collection.
 - III. Demonstrate proficiency in field-based techniques for geomorphic mapping, data collection, and analysis, incorporating GPS/GIS technologies.
 - IV. Assess and synthesize the information collected during field work and summarise the outcome leading to design and develop field reports
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Course Contents:

Unit 1. Field Survey - basics

- 1.1. Basics of Field work: objective of field work (physical or socioeconomic), Identifying the case-studies and defining the field model (conceptual geographical model)
- 1.2. Identification of field techniques to be used:
 - 1.2.1. Measurement – nature of measurement (nominal, ordinal, interval and ratio); Key aspects (validity, reliability, Precision and Accuracy)
 - 1.2.2. Sampling – Key elements (Population, bias, sample size etc.); methods (simple random, stratified and systematic), errors

Practical: Study area is to be conveniently finalized as per the identified objective of field work for stressing on any local problem or any contemporary issue. Field model should be determined.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 2. Collecting data from field

- 2.1. Data source and collection – primary and secondary;
- 2.2. Surveying (Physical) – Plane Table Survey; Prismatic Compass Survey; Theodolite, and Dumpy level; Global Positioning System (GPS)

2.3. Surveying (Socioeconomic) - Observation (Participants and non-participants), Questionnaire (Open, close, structured and non-structured) and interview (individual and focus groups)

Practical: Identify data source and collection methods as per the designed field model for the selected problem in unit 1. Collect data. Note: Field work must not exceed 7 days.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Unit 3. Field report writing

3.1. Text of the Report should ideally be divided into the following sections: Introduction and Statement of problem(s), Aim and Objectives, Materials and methods, Analysis and Results, Discussions, Conclusion, References/ Bibliography (API for Harvard Format) and Appendices (if any).

Practical: Perform the analyses from collected data and write a report with Figures and Tables captioned properly. Note: Report should not exceed 5,000 words (max 15 pages excluding references).

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 4. Final report

- 4.1. Seminar Presentation (based on socioeconomic survey) would carry 20% of total marks.
- 4.2. Record & Viva would carry 20% of total marks

Note: Final copy of the report (along with soft copy) must be submitted to the department.

Reading List

1. Bhopal Singh R L and Duttta P K (2012) Prayogatama Bhugol, Central Book Depot, Allahabad
2. Rice, S. 2003. Ch 17: *Sampling in Geography*. In: Clifford, N., French, S., Valentine, G. (Eds) *Key Methods in Geography*, London: Sage Publication.
3. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
4. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
5. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
6. Stoddard, R.H. 1982: *Field Techniques and Research Methods in Geography*, National Council for Geographic Education Pacesetter Series, Lounsbury/Sommers/Fernald.

Online Resources:

1. Brunet, R. 2001. *Models in geography? A sense to research*, CyberGeo, 204.
<https://doi.org/10.4000/cybergegeo.4288>
 2. Rana, L. 2021. Models, Theory & Systems Analysis In Geography [online]. Available at:
http://ags.geography.du.ac.in/Study%20Materials_files/Lalita%20Rana_SC.pdf
 3. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
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DISCIPLINE SPECIFIC ELECTIVE (DSE)

GEO (IDSE) – 306 [A]: Introduction to Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide a thorough understanding of Geography to the students from different background.

Course Outcomes:

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

- I. Recognize and state basic concepts of Geography
 - II. Understand, discuss and describe fundamental concepts of Geography
 - III. Understand, discuss and describe fundamental concepts associated with climate
 - IV. Analyses the environmental challenges and disasters occurring on the global
-

Course Contents:

Unit 1. Basics about Geography

- 1.1. Concept and branches of Geography; Elements of Geography (space, place and time);
- 1.2. Concept of landscape in Geography - relation between physical and cultural landscapes;

(Covers OBE level – Remember)

Unit 2. Fundamental concepts related to Earth

- 2.1. Earth History and Earth Interior;
- 2.2. Rocks and faults
- 2.3. Drifting Continents and Plate Tectonics

(Covers OBE level – Remember and Understand)

Unit 3. Fundamental concepts related to Climate

- 3.1. Atmospheric pressure and winds, Atmospheric disturbances;
- 3.2. Factors affecting climate, factors affecting climate of India
- 3.3. Global Climatic classification with special focus on India
- 3.4. Biomes

(Covers OBE level – Remember, Understand and Apply)

Unit 4. Environmental challenges and Disasters

- 4.1. Major environmental issues of the world – Climate Change, Sustainability
- 4.2. Disasters: Volcanoes & Earthquakes, Tsunami;

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List

1. Singh, Savinder (2009) – Physical Geography, Prayag Pustak, N.Delhi.
 2. Chorley, R.J., et al. (1984). Geomorphology. New York: John Wiley and Sons.
 3. Hugget, R.J. (2011). Fundamentals of Geomorphology. London: Routledge.
 4. Kale, V.S and Gupta A. (2010). Introduction to Geomorphology. New Delhi: Cambridge University Press.
 5. Strahler, A. (2006). Introduction to Modern Physical Geography. New York: John Wiley & Sons.
 6. Thornbury, W. D. (2004). Principles of Geomorphology. New Delhi: CBS.
 7. Trewartha G. T. and Horne L. H., 1980: An Introduction to Climate, McGraw-Hill.
 8. Lal, D S (2006): Climatology, Prayag Pustak Bhavan, Allahabad
 9. Council, N. R. (2006). Facing Hazards and Disasters: Understanding Human Dimensions. Washington: National Academies Press.
 10. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
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GEO (IDSE) – 306 [B]: Human Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide a thorough understanding of distribution and compositions of humans.

Course Outcomes:

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

- I. Recognize and state basic concepts of Human Geography
 - II. Review, understand and summarise population dynamics
 - III. Review and analyse demographic characteristics
 - IV. Examine social composites
-

Course Contents:

Unit 1. Basics about Human Geography

- 1.1. Definition, nature and scope of Human Geography;
- 1.2. Culture - meaning and elements; Cultural Regions of the world;
- 1.3. Races of the world

(Covers OBE level – Remember)

Unit 2. Population dynamics

- 2.1. World Population: Growth and Distribution;
- 2.2. Rural and Urban composition – world and India;

(Covers OBE level – Remember and Understand)

Unit 3. Demographic characteristics

- 3.1. Age, sex, literacy, fertility, mortality, occupational structure and migration.
- 3.2. Demographic Transition Theory;

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Social composites

- 4.1. Race, Religion and language;
- 4.2. Settlements - Types and patterns
- 4.3. Trends and Patterns of Urbanization – world and India

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List –

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
 2. Hassan, M.I. (2005) Population Geography, Rawat Publications, Jaipur
 3. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.
 4. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
 5. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.
 6. Kaushik, S.D. (2010) Manav Bhugol, Rastogi Publication, Meerut.
 7. Maurya, S.D. (2012) Manav Bhugol, Sharda Pustak Bhawan. Allahabad.
 8. Hussain, Majid (2012) Manav Bhugol. Rawat Publications, Jaipur
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GEO (IDSE) – 306 [C]: Economic Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

to provide a balanced understanding of economic geography to students of different disciplinary background.

Course Outcomes:

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

- I. Explore and critique nature, scope and concept of Economic Geography
 - II. Gain foundational understanding of Economic Geography, including its key concepts, theories, methods of analysis, activities and regions
 - III. Interpret, compare and examine different factors of economic activities and relate them with location and development of the economic activities, particularly in India.
 - IV. Assess the regional disparity of economic development particularly in case of India keeping the history of Indian economic development in context.
-

Course Contents:

Unit 1. Introduction to Economic Geography

- 1.1. Economic Geography: Definition, nature and scope
- 1.2. Concept of economic activities

(Covers OBE level – Remember and Understand)

Unit 2. Types of economic activities and regions

- 2.1. Economic activities: Primary activities (Agriculture- Subsistence and Commercial), forestry, fishing and mining; Secondary activities (Manufacturing- Cotton textile, and Iron and Steel); Tertiary activities: Transport, trade and services
- 2.2. Regions: Special economic zones and Technology Parks

(Covers OBE level – Remember and Understand)

Unit 3. Economic activities: factors, location and development

- 3.1. Factors affecting Location of economic activity (special reference to Agriculture, Industry and Services) such as Land, Labour, Capital, Transportation and Economies of scale
- 3.2. Location of economic activity Models (Von Thunen and Weber's models); case study: Location of iron and steel industries/cotton industries
- 3.3. Economic Development (Spatial and temporal aspects):

- 3.3.1. Spatial: Measures, Classification of countries.
- 3.3.2. Temporal: Stages of economic growth: Rostow's models

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Economic Development in India

- 4.1. Regional disparity: Natural and cultural factors
- 4.2. Stages of economic growth in India: Pre and Post-Independence, Green revolution, privatisation and globalisation.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List

1. Alexander J. W., 1963: *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
 2. Bagchi-Sen S. and Smith H. L., 2006: *Economic Geography: Past, Present and Future*, Taylor and Francis.
 3. Coe N. M., Kelly P. F. and Yeung H. W., 2007: *Economic Geography: A Contemporary Introduction*, Wiley-Blackwell.
 4. Hodder B. W. and Lee Roger, 1974: *Economic Geography*, Taylor and Francis.
 5. Combes P., Mayer T. and Thisse J. F., 2008: *Economic Geography: The Integration of Regions and Nations*, Princeton University Press.
 6. Durand L., 1961: *Economic Geography*, Crowell.
 7. Hanink, D. M. (1997). *Principles and Applications of Economic Geography, Economy, Policy, Environment*, John Wiley and Sons, New York
 8. Hartshorne, T.A. and J.W. Alexander (1988) – *Economic Geography*, Prentice Hall.
 9. Janaki. V.A. (1985) – *Economic Geography*, Concept Publishing Co.
 10. Knox, P. and J. Agnew (1998) – *The Geography of the World Economy*. Arnold, London
 11. Thomas, Conkling and Yeates (1974) – *Geography of Economic Activity*, Mc Graw Hill, New York.
 12. Wheeler J. O., 1998: *Economic Geography*, Wiley.
 13. Willington D. E., 2008: *Economic Geography*, Husband Press.
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SEMESTER - IV

GEO – 401: Regional Development and Planning

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide essential understanding of the social and cultural side of Geography with emphasis on India.

Course Outcomes:

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

- I. Recognise, define and describe the basic elements of Regional development and planning
 - II. Outline, distinguish and relate theories, models and indicators of Regional Planning
 - III. Examine planning regions with particular emphasis on India
 - IV. Examine, compare and explain different concepts and contemporary issues with particular emphasis on India
-

Course Contents:

Unit 1. Basics elements

- 1.1. Concept of Planning;
- 1.2. Types of Planning;
- 1.3. Concept of Regional Planning;
- 1.4. Region: Types of Region;
- 1.5. Methods of Delineation of Different Types of Region.

(Covers OBE level – Remember and Understand)

Unit 2. Regional Planning Theories, models and indicators (With emphasis on India)

- 2.1. Growth Pole Theory;
- 2.2. Spatial Diffusion Theory;
- 2.3. Cumulative Causative Model;
- 2.4. Human Development Index & its Indicators;
- 2.5. Regional Disparity in India;

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Planning Regions (With emphasis on India)

- 3.1. Planning Regions of India (Macro, Meso & Micro);
- 3.2. Planning for Command Area Development;
- 3.3. Watershed Management; Hill & Tribal Area Development.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Concepts and contemporary issues (With emphasis on India)

- 4.1. Concept of Multi-Level Planning
- 4.2. Decentralised Planning;
- 4.3. People Participation in Planning Process;
- 4.4. Panchayati Raj System;
- 4.5. Environmental Issues in Regional Planning;
- 4.6. Sustainable Development Planning.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Chand, M., & Puri, V. K. (1983). Regional Planning in India. New Delhi: Allied
 2. Dawkins, D. J. (2003). Regional Development Theory: Conceptual Foundations, Classic Works, and Recent Developments. *Journal of Planning Literature*, 18 (2), 131-172.
 3. Issard, W. (1956). Location and Space Economy. Massachusetts: MIT Press.
 4. Issard, W. (1971). Methods of Regional Analysis : An Introduction to Regional Science. Cambridge: MIT
 5. Maboguje, A. L., & Mishra, R. P. (1995). Regional Development Alternatives: International Perspectives. Nagoya: United Nations Centre for Regional Development Series (1-7), on Regional Development.
 6. Mishra, R. P. (1992). Regional Planning: Concepts, Tools, Techniques and Case Studies. New Delhi (Revised Edition): Concept.
 7. Mitra, A. (1968). Levels of Development in India, Census of India 1961. Monograph No.7.
 8. Mohapatra, A. C., & Pathak, C. R. (2003). Economic Liberalisation and Regional Disparities in India. Shillong: Star Publication House.
 9. Sundaram, K. V. (1985). Geography and Planning. New Delhi: Concept. 10. Richardson, H. W. (1969). Urban and Regional Economics. London: World Univ Press.
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GEO – 402: Environmental Geography

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Basic knowledge of Environmental studies

Aim of the Course:

is to train students on fundamental issues that raised due to the intersection of geography and environmental science, with a precise focus on different geographical approaches, humans' impact on physical environment and initiatives to control modification of environment.

Course Outcome:

On completion of the course, student will able to

- I. Tell the components of environment with their geographical aspect; interpret the historical geographical perspective on man-environment interaction, choose and compare the different geographical approach for complex environmental problems.
 - II. Classify the source of major environmental pollutions, identify their effect; compare different pollution control measurements and decide the right way to control the pollution in a geographical set up.
 - III. Recognize the role of global warming for climate change; show how these global environmental phenomena pose threat to sustainability; outline the actionable measurement that can be taken at local to global scale to combat the problem of climate change and global warming; Explain the cause and effect of natural hazards and its interlinkage with global environmental problem; Prepare an action plan for reducing the effect of natural disaster in different geographical set up.
 - IV. Outline the various global initiatives towards making earth a sustainable planet by measurable actions of member nations; outline the various national laws for safeguards natural environment; Formulate the scope and procedures for assessing the environmental effect of any developmental project across its life cycle
-

Course Contents:

Unit 1. Concept and approach to Environmental Geography

- 1.1 Fundamentals of environment; components of environment, Environmental Geography- Concept, Significance, objective and scope;
- 1.2 Man-environment relationship on historic perspective; Environmental deterministic approach; Possibilistic approach.

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 2. Environmental pollution

- 2.1 Sources and effect of Water Pollution. Water pollution control, Water Conservation Strategies;
- 2.2 Source and cause of Air pollution and impact on health; Measure to control air pollution
- 2.3 Sources, characteristics and control of Noise Pollution; solid waste pollution and its management.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 3. Environmental challenges

- 3.1 The concept of Climatic Change; Global Warming- cause, effect and remedies;
- 3.2 Natural hazards- Flood, Earthquake, Tsunami.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Environmental initiative and Legislation

- 4.1 Earth Summit 1992 and its subsequent proceedings such as Rio+10 and Rio+20
- 4.2 Wildlife protection act of India 1972, The environment protection act of 1986, National Environmental Tribunal Act of India 1995.
- 4.3 The concept, scope, procedure of Environmental Impact Assessment (EIA).

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

1. Chandna R. C., 2002: Environmental Geography, Kalyani Publication, Ludhiana.
2. Cunningham W. P. and Cunningham M. A., 2004: Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill, New Delhi.
3. Goudie A., 2001: The Nature of the Environment, Blackwell Publication, Oxford.
4. Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson BrooksCole, Singapore.
5. MoEF, 2006: National Environmental Policy-2006, Ministry of Environment and Forests, Government of India.
6. Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.
7. Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.
8. UNEP, 2007: Global Environment Outlook: GEO4: Environment for Development, United Nations Environment Programme.
9. Trivedy R. K., 2009: Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards, EM International, Pune
10. Shrivastava A.K., 2021: Text Book of Disaster Management, Scientific Publishers

GEO – 403: Disaster Management

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

To provide basic conceptual understanding of disasters, approaches to manage disasters in order to build skills to respond to disasters.

Course Outcomes:

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

- I. Recognize, discuss and distinguish basic elements and types of disasters
 - II. Understand, discuss and discover cycle of disaster management
 - III. Review and appraise measures for Rehabilitation, Reconstruction and Recovery
 - IV. Assess the role of information technology in disaster management
-

Course Contents:

Unit 1. Introduction

- 1.1. Concept of Hazard, Risk and Disaster;
- 1.2. Classification of Disaster;
- 1.3. Meaning and Dimensions of Disaster Management.
- 1.4. Major categories: Hydrological Disasters (Flood and Drought); Geological Disasters (Earthquakes and Landslides); Meteorological Disasters (Cyclone, Tidal waves); Manmade Disasters (Chemical disasters, Biological disasters, Radiological disasters, Nuclear disasters).

(Covers OBE level – Remember and Understand)

Unit 2. Disaster Preparedness, Mitigation and Response

- 2.1. Concept and Nature of disaster preparedness;
- 2.2. Disaster Preparedness Plan.
- 2.3. Disaster Mitigation and Disaster Mitigation Strategies.
- 2.4. Disaster Response Plan, Role of Multiple Stakeholders in Disaster Response.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Rehabilitation, Reconstruction and Recovery

- 3.1. Damage Assessment, Reconstruction and Rehabilitation
- 3.2. Role of various government and non-governmental agencies in Recovery Measures.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Role of Information Technology in Disaster Management

- 4.1. Disaster management Information System;
- 4.2. Role of Geospatial Technologies;
- 4.3. Role of Communication in Disasters management –HAM radio, Satellite, Video Conferencing, Electronics devices, social media.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Reading list

1. Blaikie, P., Cannon, T., & Davis, I. (1994). At Risk: Natural Hazards, People's Vulnerability, and Disasters. London: Routledge.
 2. Council, N. R. (2006). Facing Hazards and Disasters: Understanding Human Dimensions. Washington: National Academies Press.
 3. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
 4. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
 5. Documents, G. O. (Various Years). Vulnerability Atlas (2004), Disaster Management Act (2005), Disaster Management Policy (2009).
 6. Flynn, S. (2007). The Edge of Disaster: Rebuilding A Resilient Nation. New York: Random House.
 7. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
 8. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.
 9. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
 10. Pal, I., & Shaw, R. (2017). Disaster Risk Governance in India and Cross Cutting Issues, Singapore: Springer.
 11. Paraswamam, S., & Unikrishnan, P. V. (2000). India Disaster Report. New Delhi: Oxford.
 12. Platt, R. H. (1999). Disasters and Democracy: The Politics of Extreme Natural Events. Washington: Island Press.
 13. Quarantelli, E. (1998). What is a Disaster? Perspectives on the Question. London: Routledge.
 14. Schneid, T., & Collins, I. (1998). Disaster Management and Preparedness. UNU-EHS. Various years. World Risk Reports. Washington: Lewis.
 15. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At Risk: Natural Hazards, People's Vulnerability and Disasters (2nd Ed.). London and New York: Routledge
 16. United Nations, 2021. Sustainable Development Goals [online]. Available at: <https://sdgs.un.org/goals> [Accessed on 14th June 2021]
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GEO – 404: Urbanization and Migration

Credit = 4

F.M. = 100 [20 (Mid Term) + 80 (End Term Exam)]

Prerequisite Course / Knowledge (If any): Familiarity with concepts of urbanization and migration.

Aim of the Course:

To acquaint students with the concepts of urbanization, its theories, processes and measurements; concepts of internal and international migration their types, streams, patterns, theories and measurement and implications of migration trends on urbanization.

Course Outcomes:

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

- I. Gain comprehensive understanding of the processes and patterns of urbanization, including its historical evolution, causes, and consequences as well as patterns at national and global scale.
 - II. Acquire broad understanding of the migrants their national and international patterns, cause and consequences along with various theories associated with it
 - III. Explore the structure, organization and growth of urban systems in terms of associated contexts, types, concepts and theories.
 - IV. Evaluate the problems and prospects of urbanization and migration and discuss their various policy dynamics
-

Course Contents:

Unit 1. The Process of Urbanization

- 1.1. Urbanization: Definition and concept; economic, sociological, demographic and geographical connotation of urbanization; measurement of urban growth
- 1.2. Global patterns of urbanization
- 1.3. Urbanisation in India- The emergence of Indus urbanisation; Urbanisation in post-independent India

(Covers OBE level – Remember)

Unit 2. Migration

- 2.1. Definition of the migrants: Internal and international migration; Migration selectivity: Streams; distance; age; gender; education and skills; Measurement of migration.
- 2.2. Theories of migration: Revenstein; Stouffer; Lee; Zelensiky; Lewis; Todaro.
- 2.3. Causes and consequences of migration, relevance of push and Pull factors.

(Covers OBE level – Remember and Understand)

Unit 3. Urbanization and Development

- 3.1. Urbanisation, industrialisation and economic Development in historical context

- 3.2. Slums: concept, typologies and theories;
- 3.3. Growth of slums in India
- 3.4. Urban informal sector.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Urbanisation, Migration and Sustainable Development Agenda

- 4.1. Urbanisation and the urban problems
- 4.2. Urbanisation and the Agenda for sustainable development
- 4.3. Migration and the Agenda for sustainable development

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Readings List

1. Aijaz, R. 2017. Measuring Urbanisation in India, ORF Issue Brief, Issue no 2018 [IB # 218 \(orfonline.org\)](#) [Accessed on 5th Sept 2021]
2. Beall, Jo and Fox, Sean (2009): *Cities and Development*, Routledge Perspectives on Development, Routledge, London 2. Birch, Eugenie L. and Wachter, Susan M. (2011): *Global Urbanization: The City in the Twenty-First Century*, University of Pennsylvania Press 3. Carter, Harold (2010): *The Study of Urban Geography*, Rawat Publications, Jaipur, 4th Edition.
3. Bhagat, R.B. and Mohanty, S., 2009. Emerging pattern of urbanisation and the contribution of migration in urban growth in India. *Asian Population Studies*, 5(1), pp.5-20.
4. Bhagat, R.B. 2017. *Urbanisation in India: Trend, Pattern and Policy Issues*, IIPS Working Paper No-12. IIPS, Mumbai.
5. Chandrasekhar, S. and Sharma, Ajay (May 2014): “Urbanization and Spatial Patterns of Internal Migration in India”, Indira Gandhi Institute of Development Research, Mumbai, WP-2014-016, Available at: <http://www.igidr.ac.in/pdf/publication/WP-2014-016.pdf>
6. Davis, Kingsley. 1961. *Urbanisation in India: Past and Future* in Roy Turner (ed.) *India’s Urban Future*, University of California Press, Berkeley, pp. 3-26
7. Fyfe N. R. and Kenny J. T., 2005: *The Urban Geography Reader*, Routledge.
8. Graham S. and Marvin S., 2001: *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, Routledge.
9. Hall T., 2006: *Urban Geography*, Taylor and Francis.
10. Possehl, G.L. 1990. Revolution in the urban revolution: the emergence of Indus urbanization, *Annual Review of Anthropology*, 19:261-82.
11. Kundu, Amitabh (2011): “Trends and Processes of Urbanisation in India”, *Urbanization and Emerging Population Issues – 6*, Human Settlements Group, IIED Population and Development Branch, UNFPA
12. Morris, R.N. (2007): *Urban Sociology*, George Allen and Unwin Ltd., London
13. Prakasa, Rao, V.L.S., *Urbanisation in India; Spatial Dimensions*, Concept Publishing Co., New Delhi 1983.
14. Ramachandran, R., *Urbanisation and Urban Systems in India*, Oxford University Press, New Delhi 1992.
15. United Nations, 2021. *Sustainable Development Goals* [online]. Available at: <https://sdgs.un.org/goals> [Accessed on 14th June 2021]

16. Young, A. F. (2013). Urbanization, environmental justice, and social-environmental vulnerability in Brazil. In *Urbanization and Sustainability* (pp. 95-116). Springer Netherland
 17. UN, 2009. *The World Urbanisation Prospects: The 2009 Revision*, Department of Economic and Social Affairs, Population Division, UN, New York.
 18. UN, 2019. *The World Urbanisation Prospects: The 2018 Revision*, Department of Economic and Social Affairs, Population Division, UN, New York.
 19. UN, 2003. *The Challenge of Slums Global Report on Human Settlements 2003*, UN-HABITAT, Earthscan publication ltd, London.
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GEO – 405: Project Work Report and Viva-voce

(Practical papers)

Credit = 4

F.M. = 50+50

Prerequisite Course / Knowledge (If any): Basic idea of research methods.

Aim of the Course:

is to provide essential research skills to the students in order to take cutting-edge research of any problem in real world (up to regional scale at this education stage).

Course Outcomes:

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

- I. Design a research project for any topic of choice
 - II. Manage data and perform analyses under designed research
 - III. Write report on the outcome and explain the limitations and future prospect of the research carried out and Summarise and represent the research outcomes to audiences (OBE level to be achieved – Create).
 - IV. Communicate effectively about advanced Geographic concepts and research findings through written reports, oral presentations, and visual media.
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Course Contents:

Unit 1. Dissertation

1.1. Time-line in phases

- i. 0-4 Weeks – Identification of the problem; literature review and conceptual model of research
- ii. 5-10 Weeks – Finalizing methods; data collection
- iii. 11-16 Weeks – Data analyses and results
- iv. 16- 20 weeks –Report writing; submission at the end of working day of 20th Week.

Note: Research progress should be reported at the end of each phase.

1.2. General Guide Lines:

→ The final report should cover the following structure:

- i. Introduction to the problem with Aim and objectives of the study
- ii. Literature review (aim and objective of study could also come here if not in previous section)
- iii. Material and Methods
- iv. Results
- v. Discussion
- vi. Conclusions
- vii. References/Bibliography

- Report should be typed with 1.5 Line Spacing, Arial/ Times New Roman/ Calibri Font, and 12 Font Size (Table and Figure captions 11 Font Size).
- The list of references should be given at the end in the API or Harvard format.
- Every table, figure, photograph should have a caption and source (if any).
- The total word should not exceed 10,000 in number (maximum 50 including text, figures, tables, photographs, references and appendices).

Note: Computer typed Report duly endorsed by the Supervisor(s) is to be produced individually by the students. A soft copy should be submitted to department along with dissertation.

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 2. Seminar and Viva

The students will

- Present the research carried out in the departmental seminar.
- Face a Viva Voce based on their research.

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)
