



BANKURA UNIVERSITY

(West Bengal Act XIX of 2013- Bankura University Act, 2013)

Main Campus, Bankura Block-II, P.O.: Purandarpur, Dist.: Bankura, Pin- 722155, West Bengal

Office of the Secretary

Faculty Council for Undergraduate Studies

Ref: BKU/FCUG/147/2024

Date: 18/06/2024

NOTIFICATION

As directed, the undersigned is pleased to inform all concerned that Bankura University has initiated the process to implement New Curriculum and Credit Framework for Undergraduate Programme, UGC 2022 (as per NEP 2020) for 4-years Undergraduate programme with Geography as Major, Minor etc. from the academic session 2023-2024. The Syllabus for the purpose will be framed and finalized as per the guidelines of appropriate authority. As an important corollary to the process, the workshop will be organized on the date mentioned herewith to get the feedback from the stakeholders. Present Students, Alumni, Guardians, Academicians and other stakeholders related to the specific programme/course are requested for their kind participation in the workshop and to present their views/ observations etc. The stakeholders may go through the draft syllabus attached herewith and convey their observations to the office of the undersigned on ugsecretaryoffice@bankurauniv.ac.in within seven days from the date of publication of notice.

T.A. will not be provided for the purpose.

Date: 24.06.2024

Time: 11AM

Venue: Room No. 301, Academic Building, Bankura University.

Sd/-

Dr. Arindam Chakraborty

Secretary

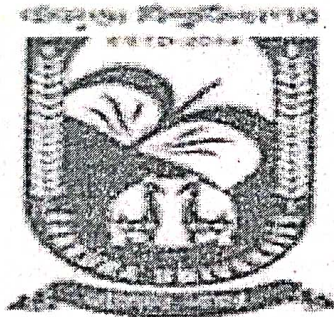
Faculty Council for Undergraduate Studies

Syllabus Geography (Major & Minor)

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NEP-2020 and UGC-CCFUP, 2022 based CBCS
Syllabus for 4-Year Undergraduate
Honours/Honours with Research Course in
GEOGRAPHY

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1. Introduction

The syllabus for Geography at undergraduate level using the Choice Based Credit System (CBCS) has been framed in compliance with model syllabus given by the UGC. The structure of the syllabus is based on the NEP-2020 proposed student centric “Curriculum and Credit Framework for Undergraduate Programme” (CCFUP-2022), incorporating a flexible CBCS, multidisciplinary approach with multiple entry-exit options in view of preparing students in the current competitive job scenario.

The main objective of framing this new syllabus is to give the students a holistic understanding of the subject, giving substantial weightage to both the core contents and techniques used in Geography. The syllabus has given equal importance to both the two main branches of geography – Physical and Human.

The aim of the syllabus is to prepare the students of Geography as good, socially conscious, thoughtful, well-rounded and creative individuals so that at the end of the course they are able to secure a job and can contribute beneficially to the process of nation building. Keeping in mind and in tune with the changing nature of the subject, adequate emphasis has been given on new techniques of mapping and understanding of the subject.

The syllabus has also been framed in such a way that the students can easily exit at different levels with basic skillsets and general understanding of the discipline to be able to fit for the current job market.

The introduction of *Geography of Tourism, Rural Development, Political Geography and Medical Geography* will definitely boost students’ analytical skills and the *Computer Applications in Geography* along with geospatial knowledge will enable students to develop their data analysis and interpretation skill which definitely boost their zeal for higher study and research and career opportunities.



2. Scheme for CBCS Curriculum

2.1 Credit Distribution across Courses

Course Type	Number of Papers	Number of Credits	
		Theory*	Practical
Core Courses (MJC)	24	18 x 3 =54 18 x 1 =18	6 x 4 =24
Minor Courses (MN)	8	4 x 3 =12 4 x 1 =4	4 x 4 =16
Multidisciplinary Courses (MD)	3		3 x 3 =9
Skill Enhancement Courses (SEC)	3		3 x 3 =9
Ability Enhancement Language Courses (AEC)	4	4 x 2 =8	
Value Added Courses (VAC)	2	2 x 4 =8	
Summer Internship (INT)*	1		1 x 2 =2
Research Project (RP)*	1		1 x 12 =12*
Total Papers/Credits	46	104 (92)	60 (72)*

*Tutorials of 1 Credit will be conducted in case there is no practical component

*Students who want to exit after first or second year have to complete one **Summer Internship** of 4 credits in addition to the 40 credits of First Year and 82 credits after Second Year.

*Students have to successfully complete a **Summer Internship** of 2 credits in Semester-V to qualify for the Degree in Geography

*Honours with Research in Geography can be awarded to a student if he/she completes Research Project of 12 credits (in lieu of 3 DSE papers of Semester-VIII) with total 164 credits (Theory-92 + Practical-72) in all Semesters.



2.2 Major Courses (MJ)

Major Specific Core (MJC)				
Year	Course Title	Semester	Theory	Practical
First	Fundamentals of Physical Geography	I	T	
	Fundamentals of Human Geography	II	T	
Second	Geomorphology	III		
	Statistical Methods in Geography	III	T	P
	Climatology	IV		
	Soil and Biogeography	IV	T	
	Cartographic Techniques in Geography	IV	T	P
Third	Map Interpretation in Geography	IV		P
	Regional Planning and Development	V		
	Geography of Economic Activities	V	T	
	Geography of India and West Bengal	V	T	
	Techniques in Environmental Geography	V	T	P
	Evolution of Geographical Thought	VI		
	Cultural and Settlement Geography	VI	T	
	Urban Geography	VI	T	
Remote Sensing Techniques	VI	T	P	
Fourth	Population Geography	VII	T	
	Geography of Tourism	VII	T	
	Rural Development	VII	T	
	Research Methodology and Field Work	VII		
	Disaster Management	VIII	T	
	Agricultural Geography*	VIII	T	P
	Medical Geography*	VIII	T	
	Political Geography*	VIII	T	

* Students secured more than 75% marks in last six semesters who opt for Honours with Research have to complete one **Research Project** of 12 credits under any of the faculty in lieu of 3 starred papers.

2.3: Minor Courses (MN)

Sl. No	Course Title	Semester	Theory	Practical
1.	Fundamentals of Physical Geography	I	T	
2.	Fundamentals of Human Geography	II	T	
3.	Geomorphology	III	T	
4.	Cartographic Techniques in Geography	IV		P
5.	Regional Planning and Development	V	T	
6.	Statistical Methods in Geography	VI		P
7.	Population Geography	VII	T	
8.	Research Methodology and Field Work	VIII		P

**2.4: Multidisciplinary Courses (MD)**

Sl. No	Course Title	Semester	Theory	Practical
1.	Surveying and Mapping Techniques	I		P
2.	GIS and GNSS	II		P
3.	Remote Sensing Techniques	III		P

2.5: Skill Enhancement Courses (SEC)

Sl. No	Course Title	Semester	Theory	Practical
1.	Elementary Practical in Geography	I		P
2.	GIS & GNSS	II		P
3.	Computer Applications in Geography	III		P

2.6: Summer Internship (INT)

Year	Conditions	Credits	Course Type
First	The students who want to exit after first year for Certificate Course in Geography have to secure 4 credits in addition to 40 credits after successfully completing Summer Internship/Apprenticeship (in Semester-I or II) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college. Those who completed Summer Internship of 4 credits in First Year will be allowed to re-enter the degree programme within three years and complete it within the stipulated maximum of seven years.	4 (Additional for Certificate Course in Geography)	Practical
Second	The students who want to exit after second year for Diploma in Geography have to secure 4 credits in addition to 82 credits after successfully completing Summer Internship/Apprenticeship (in Semester-I, II, III or IV) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college. Those who completed Summer Internship of 4 credits in Second Year will be allowed to re-enter within three years and complete the degree programme within the maximum period of seven years.	4 (Additional for Diploma in Geography)	Practical
Third	The students who want Degree in Geography have to secure mandatory 2 credits in addition to 124 credits after successfully completing Summer Internship/Apprenticeship (in Semester-V) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college.	2 (Mandatory for Degree in Geography)	Practical



3. SEMESTER-WISE STRUCTURE AND CREDIT FRAMEWORK

First Year: Certificate Course in Geography

SEM	Course ID	Course Code	Course Title	Credit	Marks			Teaching Hours/Week				
					IA	ESE		Total	L	T	P	
						T	P					
SEMESTER - I	11901 11911	S/GEO/101/MJ C-1T	Fundamentals of Physical Geography	4	10	40		50	3	1		
	11902 11912	S/GEO/102/MN -1T*	Other than Geography Major students: Fundamentals of Physical Geography	4	10	40		50	3	1		
	11903 11913	S/GEO/103/MD -1P*	Other than Geography Major students: Surveying and Mapping Techniques	3	10		40	50	3		3	
	11800 11810	ACS/104/AEC-1	Communicative English	2	10	40		50	2			
	11904 11914	S/GEO/105/SE C-1P	Elementary Practical in Geography	3	10		40	50	3		3	
	11801 11811	ACS/106/VAC-1	Environmental Studies	4	10	40		50	4			
	TOTAL IN SEMESTER-I				20	60	160	80	300	18	2	6
SEMESTER - II	21901 21911	S/GEO/201/MJ C-2P	Fundamentals of Human Geography	4	10	40		50	3	1		
	21902 21912	S/GEO/202/MN -2P	Other than Geography Major students: Fundamentals of Human Geography	4	10	40		50	3	1		
	21903 21913	S/GEO/203/MD -2P	Other than Geography Major students: GIS and GNSS	3	10		40	50	3		3	
	21800 21810	ACS/204/AEC-2	MIL	2	10	40		50	2			
	21904 21914	S/GEO/205/SE C-2P	GIS & GNSS	3	10		40	50	3		3	
	21801 21811	ACS/206/VAC-2	2A: Health & Wellness 2B: Understanding India	4	10	40		50	4			
	21802 21812	ACS/207/INT-1	Summer Internship (Additional)	4	10		40	50				
	TOTAL IN SEMESTER-II				20+4	60	160	80	300	18	2	6
	TOTAL IN FIRST YEAR				40+4	120	320	160	600	36	4	12
<p>MJC- Major Core; MN- Minor Paper; MD- Multidisciplinary Paper; AEC- Ability Enhancement Course; SEC- Skill Enhancement Course; VAC- Value Added Course; INT- Internship</p>												
<p>*Certificate Course in Geography can be awarded to a student if he/she completes Summer Internship of 4 credits in addition to total 40 credits in Semesters-I & II</p>												



Second Year: Diploma in Geography											
SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - III	31901 31911	S/GEO/301/MJ C-3T	Geomorphology	4	10	40		50	3	1	
	31902 31912	S/GEO/302/MJ C-4P	Statistical Methods in Geography	4	10		40	50	4		4
	31903 31913	S/GEO/303/MN -3T	Other than Geography Major students: Geomorphology	4	10	40		50	3	1	
	31904 31914	S/GEO/304/MD -3P	Other than Geography Major students: Remote Sensing Techniques	3	10	40		50	3		3
	31800 31810	ACS/305/AEC-3	MIL	2	10	40		50	2		
	31805 31815	S/GEO/306/SE C-3P	Computer Applications in Geography	3	10		40	50	3		3
	TOTAL IN SEMESTER-III				20	60	160	80	300	18	2
SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - IV	41901 41911	S/GEO/401/MJ C-5T	Climatology	4	10	40		50	3	1	
	41902 41912	S/GEO/402/MJ C-6T	Soil and Biogeography	4	10	40		50	3	1	
	41903 41913	S/GEO/403/MJ C-7P	Cartographic Techniques in Geography	4	10	40		50	4		4
	41904 41914	S/GEO/404/MJ C-8P	Map Interpretation in Geography	4	10		40	50	4		4
	41905 41915	S/GEO/405/MN -4P	Other than Geography Major students: Cartographic Techniques in Geography	4	10		40	50	4		4
	41800 41810	ACSHP/406/A EC-4	MIL	2	10	40		50	2		
	41801 41811	ACS/407/INT-2	Summer Internship (Additional)*	4							
TOTAL IN SEMESTER-IV				22+4	60	160	80	300	20	2	12
TOTAL IN SECOND YEAR				42+4	120	320	160	600	38	8	22
MJC- Major Core; MN- Minor Paper; MD- Multidisciplinary Paper; AEC- Ability Enhancement Course; SEC- Skill Enhancement Course; VAC- Value Added Course; INT- Internship											
*Diploma in Geography can be awarded to a student if he/she completes Summer Internship (at least 1 in 2 years) of 4 credits in addition to total 82 credits in Semesters-I, II, III & IV											



Third Year: Degree in Geography											
SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - V	51901 51911	S/GEO/501/MJ C-9T	Regional Planning and Development	4	10	40		50	3	1	
	51902 51912	S/GEO/502/MJ C-10T	Geography of Economic Activities	4	10		40	50	3	1	
	51903 51913	S/GEO/503/MJ C-11T	Geography of India and West Bengal	4	10	40		50	3	1	
	51904 51914	S/GEO/504/MJ C-12P	Techniques in Environmental Geography	4	10	40		50			4
	51905 51915	S/GEO/505/M N-5T	Other than Geography Major students: Regional Planning and Development	4	10	40		50	3	1	
	51906 51916	ACS/506/INT -3*	Summer Internship (Mandatory)	2	10		40	50			
	TOTAL IN SEMESTER-V				22	60	160	80	300	12	4
*INT- Summer Internship											
SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - VI	61901 61911	S/GEO/601/MJ C-13T	Evolution of Geographical Thought	4	10	40		50	3	1	
	61902 61912	S/GEO/602/MJ C-14T	Cultural and Settlement Geography	4	10		40	50	3	1	
	61903 61913	S/GEO/603/MJ C-15T	Urban Geography	4	10	40		50	3	1	
	61904 61914	S/GEO/604/MJ C-16P	Remote Sensing Techniques	4	10	40		50			4
	61905 61915	S/GEO/605/M N-6P	Other than Geography Major students: Statistical Methods in Geography	4	10		40	50	4		4
	TOTAL IN SEMESTER-VI				20	50	120	80	250	17	3
TOTAL IN THIRD YEAR				40+2	110	280	160	550	33	7	12
MJC- Major Core; MN- Minor Paper; INT- Internship											
*Degree in Geography can be awarded to a student if he/she completes Summer Internship of 2 credits in addition to total 124 credits in Semesters-I, II, III, IV, V & VI											



Fourth Year: Honours/Honours with Research in Geography											
SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - VII	71901 71911	S/GEO/701/M JC-17T	Population Geography	4	10		40	50	3	1	
	71902 71912	S/GEO/702/M JC-18T	Geography of Tourism	4	10		40	50	3	1	
	71903 71913	S/GEO/703/M JC-19T	Rural Development	4	10	40		50	3	1	
	71904 71914	S/GEO/704/M JC-20P	Research Methodology and Field Work	4	10	40		50			4
	71905 71915	S/GEO/705/M N-7T*	Other than Geography Major students: Population Geography	4	10	40		50	3	1	
	TOTAL IN SEMESTER-VII				20	50	120	80	250	16	4
SEM	Course ID	Course Code	Course Title	Credit	MARKS				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - VIII	81901 81911	S/GEO/801/M JC-21T	Disaster Management	4	10	40		50	3	1	
	81902 81912	S/GEO/802/M JC-22T	Agricultural Geography*	4	10	40		50	3	1	
	81903 81913	S/GEO/803/M JC-23T	Medical Geography*	4	10	40		50	3	1	
	81904 81914	S/GEO/804/M JC-24T	Political Geography*	4	10	40		50	3	1	
	81905 81915	S/GEO/805/M JE-11P	Research Project*	12	30		120	150			12
	81905 81915	S/GEO/806/M N-8P	Other than Geography Major students: Research Methodology and Field Work	4	10	40		50	4		4
* Students secured more than 75% marks in last six semesters who opt for Honours with Research have to complete one Research Project of 12 credits under any of the faculty in lieu of 3 starred (*) papers.											
TOTAL IN SEMESTER-VIII				20	50	200	0	250	16	4	16
TOTAL IN FOURTH YEAR				40	100	320	80	500	32	8	20
MJC- Major Core; MN- Minor Paper											
<p>Honours in Geography can be awarded to a student if he/she completes Summer Internship (in Semester-V) of 2 credits in addition to total 164 credits in all Semesters.</p>											
<p>Honours with Research in Geography can be awarded to a student if he/she completes Summer Internship (in Semester-V) of 2 credits in addition to total 164 credits in all Semesters provided he/she successfully completed Research Project in lieu of 3 starred (*) papers.</p>											



4. Major Courses Syllabus (Core)

4.1 S/GEO /101/MJC-1T: Fundamentals of Physical Geography

Fundamentals of Physical Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A Definition Oriented (5×2=10)	
	Section-B Short Answer Type (5×4=20)
	Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Understanding origin and evolution of Earth with special reference to cross-cutting approach like Big Bang Model
2. To have an idea of our dynamic earth and its geological make up.
3. Understanding major processes that are responsible for its surface features.
4. Understanding major pedologic and biospheric processes of the earth.

Unit 1: Earth: Origin and Tectonic Processes (20 Hours)

- 1.1 Origin of Universe (Big Bang Model), Origin of Earth (Nebular Hypothesis of Laplace and Interstellar Dust Cloud Hypothesis of Schimdt)
- 1.2 Internal Structure of the Earth: Seismological Evidences, physical, chemical and seismic properties of Earth layers
- 1.3 Isostasy: Models of Airy and Pratt; Continental Drift Theory of Alfred Wegener
- 1.4 Sea Floor Spreading; Plate Tectonic Theory- Processes at plate margins and Triple Junctions

Unit 2: Geomorphology (20 Hours)

- 2.1 Degradational Processes: Weathering, Mass Wasting and resultant landforms
- 2.2 Evolution of landforms on Uniclinal, Folded and Faulted Strata
- 2.3 Landscape Evolution Models: Davis, Penck and Hack
- 2.4 Processes of landform development in Karst, Fluvial, Glacial and Aeolian environment

Unit 3: Biosphere (20 Hours)

- 3.1 Factors of Soil formation
- 3.2 Soil profile: origin and profile characteristics of Lateritic, Podzol and Chernozem soils
- 3.3 Concepts of Biosphere, Ecosystem, Biome and Ecotone
- 3.4 Concepts of Trophic structure, Food Chain and Food Web. Energy Flow in ecosystem

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4.2 S/GEO /201/MJC-2T: Fundamentals of Human Geography

Fundamentals of Human Geography

4 Credits (60 Hours)

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A Definition Oriented (5×2=10)
Section-B Short Answer Type (5×4=20)
Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Gain knowledge on major issues of Human Geography.
2. Holistic understanding of different approaches and processes of Human Geography.
3. Developing concepts of society and its structure with an idea about space and social well being.
4. Understanding culture and its different elements.

Unit-1: Nature and Principles (20 Hours)

- 1.1 Nature and Scope of Human Geography
- 1.2 Approaches of Study: Resource, Landscape, Environmental and Contemporary
- 1.3 Recent Trends of Human Geography
- 1.4 Human Population and Environment with special reference to Development-Environment Conflict

Unit-2: Concept of Human Society (20 Hours)

- 2.1 Evolution of Human Societies: Hunting, Food Gathering and Pastoral Nomadism
- 2.2 Concept and Types of Space
- 2.3 Social Structure and Social Processes
- 2.4 Social Well Being

Unit-3: Concept of Culture (20 Hours)

- 3.1 Elements of Culture; Culture and Civilization
- 3.2 Concept of Race and Ethnicity
- 3.3 Language and Religion
- 3.4 Human Adaptation to Environment: Eskimo and Santal

Reference

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3. Daniel, P.A. and Hopkinson, M.F. (1989): The Geography of Settlement, Oliver & Boyd, London.
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5. Jordan-Bychkov et al. (2006): The Human Mosaic: A Thematic Introduction to Cultural Geography,



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8. Mandal, M. (2016), Samajik Bhugol in Bengali, Naboday Publications, Kolkata
9. Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London
10. Rubenstein, J.M. (2002), The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
11. Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London
12. Mac Iver & Page (1950), Society: An Introductory Analysis, MacMillan, India.
13. Beteille Andre, (2002): Sociology: Essays on Approach & Methods, Oxford, India.
14. Giddens, A. and Sutton P.W. (2013) Sociology (8th edition) Polity.
15. Macionis John, (2006): Sociology, Pearson Education.
16. Rawat, H.K. (2007) Sociology: Basic Concepts, Rawat, New Delhi



4.3 S/GEO /301/MJC-3T: Geomorphology

Geomorphology

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern:	Section-A: Definition Oriented (5×2=10)
	Section-B: Short Answer Type (5×4=20)
	Section-C: Long Answer Type (1×10=10)
<u>Learning Outcome</u>	
1. To have an idea of our dynamic earth and its geological make up.	
2. Understanding major processes that are responsible for its surface features.	
3. To gain knowledge on the impact of different anthropogenic processes on landforms.	

Unit-1: Fundamentals of Geomorphology (20 Hours)

- 1.1 Fundamental principles of Geomorphology
- 1.2 Concept of grade, profile of equilibrium and base level
- 1.3 Earth movements - epeirogenic, orogenic and cymatogenic earth movements.
- 1.4 Principles of landform classification: genetic and hierarchical

Unit-2: Process Geomorphology (20 Hours)

- 2.1 Hillslopes: Genesis and Morphology
- 2.2 River Basin Morphometry: linear and areal aspects
- 2.3 Climatic Geomorphology: Basic concepts, Morphoclimatic Zones of Peltier
- 2.4 Landform development in coastal areas

Unit-3: Applied Geomorphology (20 Hours)

- 3.1 Application of Geomorphic Mapping, DEM, TIN
- 3.2 Land capability and Land suitability classification
- 3.3 Types of check dam and their importance
- 3.4 Integrated River Basin Management

Reference

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- ▶ Basu, P. (2014), Prakriya Sonkranta Bhumirupbidya o Sanshlishito Jalobigyan in Bengali, Books and Allied, Kolkata
- ▶ Basu, R., Bhaduri, S. (Eds) (2007): Contemporary Issues and Techniques in Geography, Progressive Publishers.
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- ▶ Chattopadhyay, G. (2019), Mahajagotik Rahasyo in Bengali, Akshar Prakashan, Kolkata



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- ▶ Lindholm, R. (1987): A Practical Approach to Sedimentology, Allen & Unwin. Morisawa, M. 1985. Rivers,
- ▶ Longman. Mukolwe, M.M. 2016): Flood Hazard Mapping: Uncertainty and its Value in the Decision-making Process, CRC Press. Migon, P. (2010): Geomorphological Landscapes of the World, Springer, Dordrecht
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- ▶ McCullagh, P. 1978: Modern Concepts in Geomorphology, Oxford University Press, Oxford. UK.
- ▶ Morisowa, M. 1968: Streams, their Dynamics and Morphology, McGraw Hill, New York.
- ▶ Mukhopadhyay, S.; Das, R. (1994), Bhumirup: Udvab o Prakriti Vol-I & II in Bengali, Paschimbanga Rajya Pustak Parshad, Kolkata
- ▶ Pearl, R.M. (1955): How to know the Minerals and Rocks, McGraw-Hill, New York
- ▶ Petts, G.E., Amoros, C (Eds). (1996): Fluvial Hydrosystems, Chapman and Hall.
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- ▶ Sen, P.K. (1989): Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.
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- ▶ Verstappen H. 1983: Applied Geomorphology, Geomorphological Surveys for Environmental Development, Elsevier, Amsterdam



4.4 S/GEO /302/MJC-3P: Statistical Methods in Geography

Statistical Methods in Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in pen/pencil and neatly hand written and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. To have an idea on analyze of spatial data, identify patterns, and make informed decisions in various geographic contexts.
2. Understanding spatial relationships, mastering statistical techniques like regression analysis and spatial correlation, and applying these methods to real-world geographical problems.
3. To gain knowledge on how to formulate and test hypotheses about spatial phenomena, including inferential statistics and hypothesis testing techniques.

Unit-1: Data Collection and Representation

- 1.1 Geographical Data Management: Collection (Sampling Techniques- Significance and Types), Classification, Tabulation, Interpretation and Analysis of Geographical Data
- 1.2 Frequency Distribution: Attribute and Variable, Discrete and Continuous, Graphical Representation of Frequency Distribution (Histogram, Polygon, Curve and Ogives)
- 1.3 Measures of Central Tendency: Mean, Median and Mode; Skewness
- 1.4 Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Coefficient of Variation

Unit-2: Data Analysis and Interpretation

- 2.1 Simple Correlation and Linear Regression
- 2.2 Time Series Analysis: Actual Trend, Semi Average, Moving Average,
- 2.3 Standard Error of Estimate and Standard Scores (Computations and Graphical Representation)
- 2.4 Absolute Residual Mapping

Unit-3: Analysis of Hypothesis

- 3.1 Hypothesis: Concept and Types; Types of Error
- 3.2 Estimating Confidence Interval and Statistical Significance
- 3.3 Tests of Hypothesis: Chi Square Test; Student 't' Test
- 3.4 Degrees of Freedom; Rejection and Acceptance of Hypothesis



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- ▶ Ebdon D., 1977: Statistics in Geography: A Practical Approach.
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- ▶ Hazra, J.; Banik, G.C. (2020), Bhugole Rashitotter Prayog in Bengali, Naboday Publications, Kolkata



4.5 S/GEO /401/MJC-5T: Climatology

Climatology

Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Section-A Definition Oriented	(5×2=10)
	Section-B Short Answer Type	(5×4=20)
	Section-C Long Answer Type	(1×10=10)

Learning Outcome

1. Understanding the Earth's climate system, Structure and Composition of Atmosphere, Stability and Instability of the Atmosphere, mechanism of precipitation.
2. To have an idea of the role of atmospheric circulation, climate change processes.
3. Assessing the spatial and temporal variability of climate across different regions and scales.

Unit-1: Structure and Composition of Atmosphere (20 Hours)

- 1.1 Insolation: Factors and Distribution, Global Heat Budget
- 1.2 Inversion of Temperature: Processes and Impact on Surface Weather
- 1.3 Atmospheric Stability and Instability
- 1.4 Forms and processes of Condensation; Mechanism of Precipitation: Ice Crystal and Collision-Coalescence Theory

Unit-2: Atmospheric Circulation (20 Hours)

- 2.1 Factors controlling Air Motion and resulting Flow Patterns
- 2.2 Planetary Wind system with special reference to Tricellular Model; Walker Circulation and ENSO
- 2.3 Jet Stream and Rossby Waves: Origin, Characteristics and Impact on Surface Weather
- 2.4 Genesis of Monsoon with particular reference to South Asia

Unit-3: Extreme Events and Climatic Classification (20 Hours)

- 3.1 Origin and Classification Airmass; Frontogenesis and Frontolysis
- 3.2 Origin and Characteristics of Tropical and Temperate Cyclones
- 3.3 Classification of World Climates: Schemes of Koppen and Thornthwaite
- 3.4 Climate Change: Causes and Evidences; Weather forecasting

Reference

- ▶ Barry R. G. and Carleton A. M., 2001: Synoptic and Dynamic Climatology, Routledge, UK.
- ▶ Barry R. G. and Corley R. J., 1998: Atmosphere, Weather and Climate, Routledge, New York.
- ▶ Critchfield H. J., 1987: General Climatology, Prentice-Hall of India, New Delhi



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- ▶ Sil, A. (2009), Abohaya o Jalabayu in Bengali, The Himalayan Books, Kolkata



4.6 S/GEO /402/MJC-6T: Soil and Biogeography

Soil and Biogeography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A: Definition Oriented	(5×2=10)
Section-B: Short Answer Type	(5×4=20)
Section-C: Long Answer Type	(1×10=10)

Learning Outcome

1. Understanding the chemical, physical, and biological properties of soil.
2. To have an idea of different types of biomes, which can help understand the relationships between soil characteristics and ecosystem dynamics.
3. To assess the role of Human Behavior and its impact on Soil and Biosphere

Unit 1: Soil Geography (20 Hours)

- 1.1 Basic Concept: Ped, Pedon, Epipedon; Soil Catena
- 1.2 Definition and Significance of Soil Properties: Physical - Texture, Structure and Moisture.
- 1.3 Chemical Properties of Soil - pH, Organic matter and NPK
- 1.4 Principles of Soil classification: Genetic and USDA (Orders and Sub-orders).

Unit 2: Bio-Geography (20 Hours)

- 2.1 Environmental factors for Plant Growth: Climate and Soil
- 2.2 Bio-geochemical cycles with special reference to Carbon Dioxide and Nitrogen
- 2.3 Ecological Succession and Climax Community
- 2.4 Geographical extent and characteristic features of Tropical Rain Forest, Taiga and Grassland Biomes

Unit 3: Man and Biosphere (20 Hours)

- 3.1 MAB Programme: Concept and Objectives; Present status
- 3.2 Soil Erosion and Degradation: Factors, processes and mitigation measures
- 3.3 Deforestation: Causes, consequences and management
- 3.4 Bio-diversity: Definition, types, threats and conservation measures

Reference

- ▶ Biswas, T.D. and Mukherjee, S.K. 1997: Textbook of Soil Science, Tata McGraw Hill,
- ▶ Brady, N.C. and Weil, R.R. 1996. The Nature and Properties of Soil, 11th edition, Longman, London:
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- ▶ Morgan, R.P.C. 1995. Soil Erosion and Conservation, 2nd edition, Longman, London
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- ▶ Kormondy, E.J. 1996. Concept of Ecology, 4th edition, Prentice- Hall, India, New Delhi
- ▶ Myers, A. A. and Giller, P.S. (editors) 1988. Analytical Biogeography: An Integrated Approach to the Study of Animal and Plant Distribution. Chapman and Hall, London
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- ▶ Basu, P. (2012), Mritwika Bigyan: Tathya o Abhigyota, Books and Allied, Kolkata



4.7 S/GEO /403/MJC-7P: Cartographic Techniques in Geography

Mapping Techniques in Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1×10=10)
	Question-2	(1×10=10)
	Question-3	(1×10=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in pen/pencil and neatly hand written and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Skill in collecting, organizing, and analyzing spatial data for map creation.
2. Understanding the principles of Cartography and how to represent geographic data through various mapping techniques.
3. Ability to interpret Topographical Maps for better understanding of geographic features.
4. **Lab Note Book** (5+5=10)

Unit-1: Maps and Map Making

- 1.1 Definition and types of Maps
- 1.2 Base Maps, Thematic Maps and Mental Maps
- 1.3 Components of Maps
- 1.4 History of Map Making

Unit-2: Cartographic Representation of Geographical Data

- 2.1 Maps and Diagrams: Definition and Types
- 2.2 Cartograms: Line Graph, Bar graph, Proportionate Pie
- 2.3 Climatic Diagrams: Wind Rose, Ombrothermic Diagram
- 2.4 Population Diagrams: Age-Sex Pyramid, Dependency Ratio

Unit-3: Mapping Techniques

- 3.1 Measures of Density by Choropleth: Population Data, Agricultural Data
- 3.2 Measures of Inequality: Location Quotient, Gini's Coefficient and Lorenz Curve
- 3.3 Measures of Interaction: Nearest Neighbour Analysis, Gravity Model
- 3.4 Combinational Analysis: Weaver's Crop Combination

Reference

- ▶ Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production, Methuen Young Books
- ▶ Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), McGraw-Hill Higher Education



- ▶ Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, NewDelhi.
- ▶ Kraak M.-J. and Ormeling F., 2003: Cartography: Visualization of Geo-SpatialData, Prentice-Hall.
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- ▶ Slocum T. A., McMaster R. B. and Kessler F. C., 2008: Thematic Cartography andGeovisualization (3rd Edition), Prentice Hall.
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4.8 S/GEO /404/MJC-8P: Map Interpretation in Geography

Cartograms and Spatial Mapping

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1×10=10)
	Question-2	(1×10=10)
	Question-3	(1×10=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in pen/pencil and neatly hand written and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. To have an idea of Earth's history and identification of various geological features.
2. Understanding and interpreting of Weather Maps in different seasons.
3. To gain knowledge on the atmospheric dynamics.
4. **Lab Note Book** **(5+5=10)**

Unit-1: Interpretation of Topographical Maps

- 1.1 Principles and Nomenclature of Topographical Map (OSM) of Survey of India
- 1.2 Topographic Profile and Broad Physiographic Divisions
- 1.3 Drainage Basin Morphometry: Relative Relief (Smith, 1935), Average Slope (Wentworth, 1930), Stream Frequency (Horton, 1945) and Stream Ordering (1964)
- 1.4 Transect Chart

Unit-2: Geological Map

- 2.1 Basic Concepts: Strike and Dip, Rock Beds and Bedding Plane, Geological Succession, Outcrops, Unconformity
- 2.2 Construction of Geological Section: Horizontal, Uniclinal and Folded Structures
- 2.3 Topography and its relation with Underlying Structures
- 2.4 Succession of Beds and Geological history

Unit-3: Climatic Data and Weather Maps

- 3.1 Climograph and Hythergraph
- 3.2 Rainfall Dispersion Diagram
- 3.3 Conventional symbols of IMD Weather Maps
- 3.4 Interpretation of Daily Weather Maps of IMD : Pre-monsoon, Monsoon and Post-monsoon

Reference

- ▶ Bennison, G.M. (1990): An Introduction to Geological Structures and Maps, 5th Edition, Edward Arnold, London



- ▶ Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production, Methuen Young Books
- ▶ Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), McGraw-Hill Higher Education
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- ▶ Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

Web Resources

- ▶ <https://www.nios.ac.in/media/documents/316-New/Book-2/Practical-1.pdf>
- ▶ https://icaci.org/files/documents/wom/06_IMY_WoM_en.pdf
- ▶ <https://www.geokniga.org/bookfiles/geokniga-introduction-geological-structures-and-maps.pdf>
- ▶ [https://geo.libretexts.org/Bookshelves/Geology/GEOS%3A_A_Physical_Geology_Lab_Manual_for_California_Community_Colleges_\(Branciforte_and_Haddad\)/16%3A_Geological_Maps_and_Cross-sections/16.01%3A_Front_Matter](https://geo.libretexts.org/Bookshelves/Geology/GEOS%3A_A_Physical_Geology_Lab_Manual_for_California_Community_Colleges_(Branciforte_and_Haddad)/16%3A_Geological_Maps_and_Cross-sections/16.01%3A_Front_Matter)
- ▶ <https://openpress.usask.ca/geolmanual/chapter/overview-of-strike-dip-and-structural-cross-sections/>
- ▶ <https://nios.ac.in/media/documents/316courseE/L35%20STUDY%20OF%20WEATHER%20MAPS.pdf>
- ▶ <https://ncert.nic.in/textbook/pdf/kegy308.pdf>
- ▶ <https://egyankosh.ac.in/bitstream/123456789/69117/3/Unit-13.pdf>



5 Minor Courses Syllabus (MN)

5.1 S/GEO /102/MN-1T: Fundamentals of Physical Geography

Fundamentals of Physical Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern:	Section-A Definition Oriented (5x2=10)
	Section-B Short Answer Type (5x4=20)
	Section-C Long Answer Type (1x10=10)

Learning Outcome

1. Understanding origin and evolution of Earth with special reference to cross-cutting approach like Big Bang Model
2. To have an idea of our dynamic earth and its geological make up.
3. Understanding major processes that are responsible for its surface features.
4. Understanding major pedologic and biospheric processes of the earth.

Unit 1: Earth: Origin and Tectonic Processes (20 Hours)

- 1.5 Origin of Universe (Big Bang Model), Origin of Earth (Nebular Hypothesis of Laplace and Interstellar Dust Cloud Hypothesis of Schimdt)
- 1.6 Internal Structure of the Earth: Seismological Evidences, physical, chemical and seismic properties of Earth layers
- 1.7 Isostasy: Models of Airy and Pratt; Continental Drift Theory of Alfred Wegener
- 1.8 Sea Floor Spreading; Plate Tectonic Theory- Processes at plate margins and Triple Junctions

Unit 2: Geomorphology (20 Hours)

- 2.5 Degradational Processes: Weathering, Mass Wasting and resultant landforms
- 2.6 Evolution of landforms on Uniclinal, Folded and Faulted Strata
- 2.7 Landscape Evolution Models: Davis, Penck and Hack
- 2.8 Processes of landform development in Karst, Fluvial, Glacial and Aeolian environment

Unit 3: Biosphere (20 Hours)

- 3.5 Factors of Soil formation
- 3.6 Soil profile: origin and profile characteristics of Lateritic, Podzol and Chernozem soils
- 3.7 Concepts of Biosphere, Ecosystem, Biome and Ecotone
- 3.8 Concepts of Trophic structure, Food Chain and Food Web. Energy Flow in ecosystem

Reference Books

1. Bloom A. L., 2001: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.



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5.2 S/GEO /202/MN-2T: Fundamentals of Human Geography

Fundamentals of Human Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern:	Section-A Definition Oriented (5x2=10) Section-B Short Answer Type (5x4=20) Section-C Long Answer Type (1x10=10)

Learning Outcome

1. Gain knowledge on major issues of Human Geography.
2. Holistic understanding of different approaches and processes of Human Geography.
3. Developing concepts of society and its structure with an idea about space and social well being.
4. Understanding culture and its different elements

Unit-1: Nature and Principles (20 Hours)

- 1.1 Nature and Scope of Human Geography
- 1.2 Approaches of Study: Resource, Landscape, Environmental and Contemporary
- 1.3 Recent Trends of Human Geography
- 1.4 Human Population and Environment with special reference to Development-Environment Conflict

Unit-2: Concept of Human Society (20 Hours)

- 2.5 Evolution of Human Societies: Hunting, Food Gathering and Pastoral Nomadism
- 2.6 Concept and Types of Space
- 2.7 Social Structure and Social Processes
- 2.8 Social Well Being

Unit-3: Concept of Culture (20 Hours)

- 3.5 Elements of Culture; Culture and Civilization
- 3.6 Concept of Race and Ethnicity
- 3.7 Language and Religion
- 3.8 Human Adaptation to Environment: Eskimo and Santal

Reference

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16. Rawat, H.K. (2007) Sociology: Basic Concepts, Rawat, New Delhi



5.3 S/GEO /303/MN-3T: Geomorphology

Geomorphology

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)
Question Pattern:	Section-A: Definition Oriented (5×2=10)
	Section-B: Short Answer Type (5×4=20)
	Section-C: Long Answer Type (1×10=10)

Learning Outcome

5. To have an idea of our dynamic earth and its geological make up.
6. Understanding major processes that are responsible for its surface features.
7. To gain knowledge on the impact of different anthropogenic processes on landforms.

Unit-1: Fundamentals of Geomorphology (20 Hours)

- 1.1 Concept of Grade, Profile of Equilibrium
- 1.2 Concept of Base Level
- 1.3 Epeirogenic Earth movements
- 1.4 Orogenic Earth movements

Unit-2: Process Geomorphology (20 Hours)

- 2.1 Linear Aspect of River Basin Morphometry
- 2.2 Areal Aspect River Basin Morphometry
- 2.3 Landform development in Coastal Region
- 2.4 Landform development in Arid Region

Unit-3: Applied Geomorphology (20 Hours)

- 3.1 Types of Check Dams
- 3.2 Importance of Check Dams
- 3.3 Importance of Major Irrigation Project in Dry Region
- 3.4 Integrated River Basin Management

Reference

- ▶ Basu, P. (2006), Bhugathonik Prakriya o Bhumirup in Bengali, Books and Allied, Kolkata
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5.4 S/GEO /405/MN-4P: Cartographic Techniques in Geography

Cartographic Techniques in Geography

4 Credits (60 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1×10=10)
	Question-2	(1×10=10)
	Question-3	(1×10=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in pen/pencil and neatly hand written and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. To have an idea of Earth's history and identification of various geological features.
2. Understanding and interpreting of Weather Maps in different seasons.
3. To gain knowledge on the atmospheric dynamics.
4. **Lab Note Book** (5+5=10)

Unit-1: Scale and Cartograms

- 1.1 Definition and Types of Map Scale
- 1.2 Advantages and Disadvantage of Map Scale
- 1.3 Construction of Linear Scale
- 1.4 Construction of Comparative Linear Scale

Unit-2: Cartographic Representation of Geographical Data

- 2.1 Basic Concept of Cartograms
- 2.2 Cartograms: Line Graph, Bar graph
- 2.3 Age-sex Pyramid
- 2.4 Dependency Ratio

Unit-3: Mapping Techniques

- 3.1 Measure of Density: Choropleth Method
- 3.2 Measures of Inequality: Location Quotient
- 3.3 Measures of Interaction: Nearest Neighbour Analysis
- 3.4 Weaver's Crop Combination

Reference

- ▶ Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production, Methuen Young Books
- ▶ Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), McGraw-Hill Higher Education
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Multidisciplinary Courses Syllabus (MD)

6.1: S/GEO/103/MD-1P: Surveying and Mapping Techniques

Surveying and Mapping Techniques

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works to be done manually and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Measuring the earth's surface features on horizontal and vertical planes through learning of different surveying and levelling operations.
3. Develop skills of map making and basics of cartography.

Unit-1: Scale and Cartograms (15 Hours)

- 1.1 Construction of Linear and Comparative (Unit)
- 1.2 Cartograms: Proportional Circle and Pie graph
- 1.3 Age-Sex Pyramid
- 1.4 Dependency Ratio

Unit-1: Conventional Surveying (15 Hours)

- 1.1 Concepts and Principles: Angle and Bearing, Traversing, Radiation, Intersection
- 1.2 Prismatic Compass: Preparation of land use maps by open and closed traverse
- 1.3 Computations of compass traverse- Included Angle, Area of traverse
- 1.4 Levelling by Dumpy Level: Profile and Contouring

Unit 3: Mapping Techniques (15 Hours)

- 3.1 Population Maps and Diagrams: Choropleth method
- 3.2 Measures of Inequality: Location Quotient
- 3.3 Measures of Interaction: Nearest Neighbour Analysis
- 3.4 Combinational Analysis: Weaver's Crop Combination

References

1. Anson R. and Ormelling F. J., 1994: International Cartographic Association: Basic Cartographic Vol. Pregmen Press.
2. Gupta K.K. and Tyagi, V. C., 1992: Working with Map, Survey of India, DST, New Delhi.
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6. Future, Elsevier, International Cartographic Association.
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10. Agor, R. (1999), Textbook of Surveying and Levelling, Khanna Publishers, Delhi
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6.2: S/GEO/203/MD-2P: Geographical Information System

Geographical Information System

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works to be done in computer and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Students will have practical experience on handling GIS softwares and its theoretical background.
2. At the UG level, students will also be able to make their own maps in GIS software and they will have hands on experience on Digital Cartography.
3. They will also be able to handle GPS/GNSS devices, collect waypoints and working with them in MS-EXCEL as well as GIS platforms.

Unit-1: Basic Concepts (15 Hours)

- 1.1 Components of GIS
- 1.2 Projection and Datum
- 1.3 Data Structure: Raster and Vector
- 1.4 Introduction to QGIS Software

Unit-2: GIS Data Input and Mapping (15 Hours)

- 2.1 Georeferencing, Digitization of maps using QGIS Software
- 2.2 Import of Excel Data in QGIS
- 2.3 Map Composition and Layout- Choropleth, Isopleth and Dot Map
- 2.4 Proportional Pie and Bargraph

Unit-2: GNSS Surveying (15 Hours)

- 2.1 Basic Concept: GNSS and GPS, Segments, PRN Code, Waypoints and Tracks, Sources of Error
- 2.2 Distance Calculation, Open and Closed Traverse.
- 2.3 Plotting in Microsoft Excel
- 2.4 GNSS/GPS data downloading in software and mapping.

References

1. Jatin Pandey and Darshana Pathak, 2013, Geographic Information System, TERI Publishing House.
2. Chor Pang Lo, 2009, Concepts and Techniques of Geographic Information System, Prentice Hall.



3. Michael N. Demers, 2012, Fundamentals of Geographic Information Systems, Willy.
4. Chairsman, N. 1992. Exploring Geographical Information Systems, John
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6.3: S/GEO/304/MD-3P: Remote Sensing Techniques

Remote Sensing Techniques

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in QGIS software and theoretical portions are to be neatly hand written/computer typed and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Unit-1: Basic Concepts

- 1.1 Energy Sources, Interactions with atmosphere, Interactions with Earth's surface
- 1.2 Sensing Systems: Types of RS satellites and sensors
- 1.3 Sensor Resolutions: Spatial, Spectral, Radiometric and Temporal
- 1.4 Principles of preparing Standard False Colour Composites

Unit-2: Data Acquisition and Classification

- 2.1 Free sources of Remote Sensing data: NRSC Bhuban and USGS
- 2.2 Principles of image interpretation and feature extraction
- 2.3 Image classification: Supervised and Unsupervised
- 2.4 Preparation of NDVI

Unit-3: Terrain Modeling

- 3.1 Introduction to DEM and its sources: CARTODEM, SRTM and ASTER DEM
- 3.2 DEM visualization: Hillshade
- 3.3 Preparation of Slope map
- 3.4 Contour extraction from DEM

Reference

- ▶ Campbell J. B., 2007: Introduction to Remote Sensing, Guildford Press.
- ▶ Jensen J. R., 2004: Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall.
- ▶ Joseph, G. 2005: Fundamentals of Remote Sensing, United Press India.
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- ▶ Singh R. B. and Murai S., 1998: Space-informatics for Sustainable



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7. Skill Enhancement Courses Syllabus (SEC)

7.1: S/GEO/105/SEC-1P: Elementary Practical in Geography

Elementary Practicals in Geography

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done manually in note books and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Developing concepts in projecting the earth as a planet.
3. Students will be capable of identifying major rocks and minerals that make up our planet and have hands on training on different meteorological instruments.

Unit-1: Map Scale (15 Hours)

- 1.1 Definition and Types of Map Scale
- 1.2 Construction of Linear, Comparative (Unit), Diagonal and Vernier scales.
- 1.3 Scale Enlargement and Reduction (Computations)
- 1.4 Calculation of area from maps (Graphical Methods)

Unit-2: Map Projections (15 Hours)

- 2.1 Map Projections: Nature, Classification and Uses
- 2.2 Basic Concepts: Parallels and Meridians, Datum, Geoid, Scale Factor, Deformation, Orthodrome and Loxodrome.
- 2.3 Principles, Theories, Construction and Properties of select Map Projections: Conical Case- Simple Conical with one Standard Parallel and Polyconic; Cylindrical Case- Equal Area, Mercator; Zenithal Case- Gnomonic, Stereographic
- 2.4 UTM Grid System.

Unit-3: Rocks-Minerals and Instruments (15 Hours)

- 3.1 Megascopic Identification of Rocks: Granite, Basalt, Limestone, Shale, Sandstone, Slate, Marble and Schist
- 3.2 Megascopic Identification of Minerals: Bauxite, Calcite, Chalcopryrite, Feldspar, Galena, Haematite, Magnetite and Quartz
- 3.3 Recording of Maximum-Minimum Thermometer (Six's)
- 3.4 Recording of Fortin's Barometer, Hygrometer

Reference

1. Anson R. and Ormelling F. J., 1994: International Cartographic Association: Basic



Cartographic Vol. Pregmen Press.

2. Gupta K.K. and Tyagi, V. C., 1992: Working with Map, Survey of India, DST, New Delhi.
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Online Materials

- ▶ <https://egyankosh.ac.in/bitstream/123456789/66733/1/Experiment-1.pdf>
- ▶ <https://egyankosh.ac.in/bitstream/123456789/66739/1/Experiment-7.pdf>
- ▶ https://www.atri.edu.in/images/pdf/departments/Manual_Geology.pdf



7.2: S/GEO/205/SEC-2P: GIS and GNSS

GIS and GNSS Applications

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1x10=10)
	Question-2	(1x10=10)
	Question-3	(1x10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done in computer and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Developing concepts in projecting the earth as a planet.
3. Students will be capable of identifying major rocks and minerals that make up our planet and have hands on training on different meteorological instruments.

Unit-1: Geographical Information System (15 Hours)

- 1.1 GIS: Basic Concepts
- 1.2 Components of GIS
- 1.3 Development of GIS Technology
- 1.4 GIS Data structure: Raster and Vector

Unit-2: Introduction to GNSS (15 Hours)

- 2.1 Basic Concept: GNSS and GPS, Segments, PRN Code, Waypoints and Tracks
- 2.2 Distance Calculation, Open and Closed Traverse.
- 2.3 Plotting in Microsoft Excel
- 2.4 GNSS/GPS data downloading in QGIS software and mapping.

Unit 3: Mapping in GIS (15 Hours)

- 3.1 Geo-referencing and Reprojection of maps using QGIS Software
- 3.2 Digitization of maps using QGIS Software
- 3.3 Attribute data creation and uses: Choropleth, Isopleth, Dot Map, Bargraph and Proportionate Pie Diagram
- 3.4 Map Composition and Map Layout

References

1. Jatin Pandey and Darshana Pathak, 2013, Geographic Information System, TERI Publishing House.
2. Chor Pang Lo, 2009, Concepts and Techniques of Geographic Information System, Prentice Hall.
3. Michael N. Demers, 2012, Fundamentals of Geographic Information Systems, Wiley. New York
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7.3: S/GEO/306/SEC-3P: Computer Applications in Geography

Computer Applications in Geography

3 Credits (45 Hours)

Total Marks:	50 (IA-10 Marks + ESE-40 Marks)	
Question Pattern:	Question-1	(1×10=10)
	Question-2	(1×10=10)
	Question-3	(1×10=10)
	Lab Note Book & Viva-Voce	(5+5=10)

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works to be done in computer and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Students will learn basics of computer architecture- hardware and software components, operating systems, input and output devices etc.
2. They will be made capable of handling MS-EXCEL particularly statistical calculations, formula making and graphical representation of data which has immense application in higher studies..

Unit-1: Computer Basics

- 1.1 Components of Computer System: Hardware, Software
- 1.2 Concept of computing, Data and Information
- 1.3 Operating Systems, User Interface
- 1.4 File and Directory Management, Common utilities of computer in geography

Unit-2: Understanding Spreadsheets

- 2.1 Data Entry: Arrangement into ascending and descending order
- 2.2 Manipulation of cells, formulas and functions
- 2.3 Computation of Mean, Median, Mode, Standard Deviation using formula for ungrouped and grouped data
- 2.4 Graphical Representation: Line, Bar, Pie/Doughnut, Scatter Diagram, Fitting of Trend Lines

Unit-3: Internet Basics

- 3.5 Concept of Internet, World Wide Web, Search Engine, URLs
- 3.6 Internet Surfing: generation and extraction of information
- 3.7 Basics of Electronic Mails, Emails
- 3.8 Cloud Computing and Drive Sharing



Reference

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- ▶ Chauhan, S.; Chauhan, A. and Gupta, K. (2006): Fundamental of Computer; Firewall Media.
- ▶ Flake, L.J.; McClintock, C.E. and Turner, S. (1989): Fundamental of Computer Education; Wordsworth Pub. Co.
- ▶ Leon, A. and Leon, M. (1999): Introduction to Computer, USB Publishers' Distributors Ltd.
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- ▶ Rajaraman, V. (2003): Fundamentals of Computer, Prentice Hall Publisher
- ▶ Sarkar, A. and Gupta, S.K (2002): Elements of Computer Science, S Chand and Company, New Delhi
- ▶ Blissmer (1996): Working with MS Word; Houghton Mifflin Co.
- ▶ Johnson, Steve (2007): Microsoft Power Point 2007; Pearson Paravia Bruno.
- ▶ Leon, A. and Leon, M. (1999): Introduction to Computer, USB Publishers' Distributors Ltd.
- ▶ Leon, A. and Leon, M. (1999): A beginners Guide to Computers, Vikas
- ▶ Rajaraman, V. (2008): Computer Primer; Prentice Hall of India Pvt. Ltd.

- ▶ Sarkar, A. and Gupta, S.K (2002) Elements of Computer Science, S Chand and

8. Course Objectives

The principal objectives of this undergraduate course in Geography are:

- i. To understand the core content and techniques particularly modern techniques in geography.
- ii. To explore the theories and techniques used in regional planning and development.
- iii. The syllabus also aims to develop basic skills of the subject to prepare students to pursue higher studies in geography and to make them successful in search of suitable employment.

9. Course Outcomes

The Geography is the study of distribution of elements over space as well as the mutual and reciprocal relationship between man and environment. It also studies different activities of man in different milieu of life in changing the face of the earth, how 'space' turns into 'place' with different values added to it by man's varied modes of life with due emphasis on major empirical questions of 'what', 'why', 'how' and 'where'. Therefore, the study of this discipline at undergraduate level would have the following learning outcomes in general:

- i. It helps to develop a holistic understanding of the earth as the home of man.
- ii. Student can understand what Geography really is. They shall come to know that geography is not merely a 'science of placenames', rather it is true science of distribution with expertise in various modern skills and techniques.
- iii. Students will be to find their place in job market both in academic as well as corporate sector.
- iv. Students also can explore the engineering aspects of the discipline particularly Geoinformatics, Geoinformation Science, Geomatics Engineering etc.
- v. At the end of the course, students will be capable of segmenting the whole discipline in three different components- physical, human and applied.

10. Programme Specific Outcomes (PSO)

Geography is widely accepted as the most emerging science in recent years due to its versatile character to include contents of both science and humanities. Therefore, students from both the streams can choose the subject at their undergraduate level. Bankura University offers B.Sc, degree in Geography keeping in view the demand of the students as well as towards making it more suitable for higher education where stiff competition is prevailed from other science students. Since its inception, the university follows CBCS curriculum based on UGC guidelines with slight modification in view of the local aspects. Geography basically deals with space. The spatial aspects of the earth, their guiding laws and theories, nature and evolution are recorded and represented through a number of instrumental and mechanical ways. A holistic view of the Earth as an entity and the features within the earth are taught to students. The evolution of natural landscape to cultural landscape is illustrated. The mapping techniques are guides to represent all the physical, social, cultural features through proper scaling and elaborative description. The project based studies and analyses are very helpful in building up a research outlook among the students. They learn about the sample drawing procedures and detailed idea about the important issues around them. The course is intersected into several small sections and put under expert faculties of that field to provide the students the desired benefit of the course. The Programme Specific outcomes can be listed as under:

PSO-1: Acquiring Knowledge of Physical Geography

Fundamentals of Physical Geography will help students to gain the knowledge of physical aspects of the earth. They will gather knowledge about the processes that make up the planet earth. Imbibing knowledge,



skills and holistic understanding of the Earth, atmosphere, biosphere and the planet through analysis of landform development; crustal mobility and tectonics, and different biospheric processes.

PSO-2: Acquiring Knowledge of Human Geography

With base knowledge of Physical Geography, students can easily correlate the knowledge of physical geography with the human geography, establishing man-environment relationships; and exploring the place and role of Geography vis-a-vis other social and earth sciences. They will be able to analyze the problems of physical as well as cultural environments of both rural and urban areas. Moreover, they will try to find out the possible measures to solve those problems.

PSO-3: Developing Quantitative Skills

Students will be able to quantitatively measure earth and its surface features- both natural and man made by developing skills on map scales, different surveying and mapping techniques.

PSO-4: Training on Surveying and Meteorological Instruments

Students will have rigorous training on various conventional as well as modern surveying instruments, different meteorological instruments to make them suitable for current job market. This will learn how to collect primary data on earth and its surface features which they can apply in their higher studies.

PSO-5: Skill Enhancement in Automated Cartography and Data Analytics

In this age of data science, the Remote Sensing, Geographical Information System and GNSS techniques will enable students to collect data and will learn analytical procedures in computer softwares which will definitely enhance students’ skillsets towards understanding of big data. Geographers in this field can surpass other disciplines because they are able to handle spatial data.

11. Technical Skill sets and possible Job opportunities after each exit

Semester	Exit Level	Credits	Technical Skillsets	Job Opportunities
II	Certificate	40+4	<ul style="list-style-type: none"> • Geomorphic Analysis • Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying 	<ul style="list-style-type: none"> • Field Surveyor • GIS Expert in Govt. and private sector • Digital Cartographer
IV	Diploma	82+4	<ul style="list-style-type: none"> • Climatic Data Analysis • Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying 	<ul style="list-style-type: none"> • Field Surveyor • GIS Expert in Govt. and private sector • Digital Cartographer
VI	Degree	124	<ul style="list-style-type: none"> • Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying • Tourism Management • Digital Image Processing 	<ul style="list-style-type: none"> • Field Surveyor • GIS Expert in Govt. and private sector • Project Assistants in academic institutions • Hotels and Tourist Industries such as Travel Agency, Transport Operators
VIII	Degree with Honours/ Research	164	<ul style="list-style-type: none"> • Map Interpretation • Disaster Management Techniques • Climate Change concepts • Knowledge on diseases and their distribution 	<ul style="list-style-type: none"> • Tourism Planner • Town Planner • Cartographer • GIS Consultant • Geography Teacher • Geography Researcher