

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१-२६०९०९४ ०२३१-२६०९४८७	
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Ref.No.SU/BOS/Science/282

Date: 03/08/2026.

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur

The Director /Head/Co-ordinator
All Concerned Department (Science)
Shivaji University, Kolhapur.

Subject: Regarding syllabi of M.A./M.Sc. Part II Geography degree programme under the Faculty of Science and Technology as per NEP-2020.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi and equivalence of M.A./M.Sc. Part II Geography degree programme under the Faculty of Science and Technology as per NEP-2020.

This syllabus, nature of question and equivalence shall be implemented from the academic year 2026-2027 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in>Syllabus>Syllabus As per NEP2020.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. Two chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,



Dy Registrar

Encl: as above

for information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	7	I.T.Cell /Computer Centre
2	Director, Board of Examinations and Evaluation	8	Eligibility Section
3	Chairman, Respective Board of Studies	9	Affiliation (T.1) Section
4	B.Sc.-M.Sc. Exam Section	10	P.G. Seminar Section
5	Internal Quality Assurance Cell (IQAC Cell)	11	P. G. Admission Section
6	Appointment A & B Section	12	Affiliation (T.2) Section

SHIVAJI UNIVERSITY, KOLHAPUR



Established: 1962

A⁺⁺ Accredited by NAAC (2021) with CGPA 3.52

***Structure and Syllabus in Accordance with
National Education Policy - 2020***

(with Multiple Entry and Multiple Exit Option)

for the degree of

M.A./M.Sc. in Geography
(with PG Diploma in Geography as an exit option)

Part-II

Faculty of Science and Technology

Implemented from...

Academic Year 2026-27 onwards

(i.e., from June 2026)

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1. Preamble:

The M.A./M.Sc. Programme in Geography is offered by the Department of Geography, under the Faculty of Science and Technology at Shivaji University, Kolhapur. This interdisciplinary programme is designed for postgraduate students from both Geography and science backgrounds, offering a comprehensive curriculum that integrates theoretical knowledge with practical applications in the field of Geography. The programme receives financial support from the Government of Maharashtra, and the Department also benefits from research and infrastructure grants provided through various schemes of the Government of India.

With the support of these funding agencies, the Department has significantly enhanced its infrastructure to foster an enriched and dynamic learning environment. Recognized as one of the premier geography departments in India, it offers a holistic academic curriculum that aligns with contemporary developments in the discipline. In addition to core academic training, the Department provides enrolled students opportunities to pursue discipline-specific short-term certificates and value-added courses aimed at improving employability and professional competencies.

The Department is equipped with modern teaching and learning facilities including smart classrooms, overhead LCD projectors, digital boards, a computer laboratory, Wi-Fi access, a state-of-the-art GIS laboratory with advanced mapping software, sophisticated instruments, a dedicated departmental library, and a conference/meeting hall, creating an environment conducive to academic excellence.

Students admitted to the programme are expected to possess foundational knowledge in Geography. The master's programme aims to strengthen students' abilities to apply specialized geographic knowledge in addressing real-world challenges, enhancing their skills and competencies to meet societal and professional demands. Additionally, the programme seeks to nurture entrepreneurial capacities and foster a strong research orientation among students, thereby contributing to the advancement of the discipline.

- 2. Duration:** The programme duration is two years, comprising four semesters. Each semester spans a minimum of 6 months / minimum of 120 working days (minimum 90 teaching days).

3. Eligibility for Admission:

For Level 6.0 (Part I):

Candidates must possess a Bachelor of Arts (B.A.) or Bachelor of Science (B.Sc.) degree with Geography as a principal or major subject from a recognized university or institution. Candidates holding a bachelor's degree in any discipline of science or technology or engineering from a recognized university or institution are also eligible for admission.

For Level 6.5 (Part II):

- (i) Completed Post Graduate Diploma in Geography from a recognized University/ Institution. or
- (ii) Completed a Bachelor's Degree (Honours / Research) in Geography from a recognized University/ Institution.

4. Medium of Instruction: English

5. Programme Structure:**Structure in Accordance with National Education Policy – 2020****With Multiple Entry and Multiple Exit Options****M.A./M.Sc. (Geography) Part I (Level 6.0) and M.A./M.Sc. (Geography) Part II (Level 6.5)**

Course Type	Course No. / Code	Lectures+ Tutorial (Hours/week)	Teaching Scheme		Examination Scheme				
			Theory and Practical		University Assessment (UA)			Internal Assessment	
			Practical (Hours/week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours:Min	Maximum Marks	Minimum Marks
SEMESTER-I (Duration- Six Month)									
Major Mandatory	MMT-101	4	--	4	60	24	2	40	16
	MMT-102	4	--	4	60	24	2	40	16
	MMT-103	4	--	4	60	24	2	40	16
	MMPR-104	--	4	2	30	12	2:30	20	8
Major Elective	MET-105/106/107	4	--	4	60	24	2	40	16
Research Methodology	RM-108	--	8	4	60	24	5	40	16
Total (A)		16	12	22	330	--	--	220	--
SEMESTER-II (Duration- Six Month)									
Major Mandatory	MMT-201	4	--	4	60	24	2	40	16
	MMT-202	4	--	4	60	24	2	40	16
	MMPR-203	--	4	2	30	12	2:30	20	8
Major Elective	MET-204/205	4	--	4	60	24	2	40	16
	MEPR-206/207	--	8	4	60	24	5	40	16
OJT/FP	#OJT-208	--	8**	4	100	40	3	--	--
	#FP-209	--	8**	4	100	40	3	--	--
Total (B)		12	12+8**	22	370	--	--	180	--
Total (A+B)				44	700			400	
SEMESTER-III (Duration- Six Month)									
Major Mandatory	MMT-301	4	--	4	60	24	2	40	16
	MMT-302	4	--	4	60	24	2	40	16
	MMPR-303	--	8	4	60	24	5	40	16
Major Elective	MET-304/305/306	4	--	4	60	24	2	40	16
	MEPR-307/308/309	--	4	2	30	12	2:30	20	8
	RP-310	--	8	4	100	40	4	--	--
Total (A)		12	20	22	370	--	--	180	--
SEMESTER-IV (Duration- Six Month)									
Major Mandatory	MMT-401	4	--	4	60	24	2	40	16
	MMT-402	4	--	4	60	24	2	40	16
Major Elective	MET-403/404	4	--	4	60	24	2	40	16
	MEPR-405/406	--	8	4	60	24	5	40	16
	RP-407	--	12	6	150	60	5	--	--
Total (B)			20	22	390	--	--	160	--
Total (A+B)				44	760			340	

Note(s):

•Student contact hours per week: 24 / 32 Hours (Min.)	•Total Marks for M.A./M.Sc.-I: 1100 •Total Marks for M.A./M.Sc.-II: 1100
•Theory Lectures 60 Minutes Each and Practical Lectures 120 Minutes Each	•Total Credits for M.A./M.Sc.-I(Semester I & II): 44 •Total Credits for M.A./M.Sc.-II(Semester III & IV): 44
•MMT- Mandatory Theory Course •MMPR- Mandatory Practical Course •MET- Elective Theory Course •MEPR- Elective Practical Course •RM- Research Methodology •#OJT/FP- On Job Training/ Field Project (**during vacation)	•Theory and Practical examinations will be conducted at the end of respective semester. •Practical courses may be divided into sub-sections. • Separate passing is mandatory for Theory and Practical examination as well as University and Internal assessment.
•Requirement for Entry at Level 6.0: Bachelor's degree in Geography (preferred) or any Science discipline from a recognized university •Requirement for Entry at Level 6.5: P.G. Diploma in Geography or Bachelor's Degree (Honours / Research) in Geography from a recognized University/ Institution.	
•Exit Option at Level 6.5: Students can exit after Level 6.5 with Post Graduate Diploma in Geography if he/she completes the course equivalent to minimum of 44 credits.	

Course Type and Credit Distribution

Course Type	Course Code	Number of Courses	Credit Per Course	Total Credits
Mandatory - Theory	MMT	09	04	36
Mandatory – Practical	MMPR	03	02/04	08
Elective - Theory	MET	04	04	16
Elective - Practical	MEPR	04	02/04	10
Research Methodology	RM	01	04	04
Field Project / Job Training	FP/OJT	01	04	04
Research Project	RP	02	04/06	10

6. Programme Outcomes (POs):

After the successful completion of M.A./ M.Sc. Geography, the student will be able to

1. Demonstrate in-depth knowledge of physical and human geography, including its foundational theories, principles, and emerging subfields.
2. Develop the ability to make comprehensive analysis, interpret spatial problems, and suggest proper solutions by using theoretical, methodological, and instrumental knowledge of Geography.
3. Apply geographic knowledge and skills to meet contemporary societal and professional needs, enhancing employability in education, research, planning, geospatial technology, and allied sectors.
4. Understand and promote sustainable management of natural resources by integrating ecological awareness with geographical perspectives.
5. Critically evaluate regional, national, and global environmental challenges, and stay updated with recent developments, geospatial innovations, and policy frameworks.
6. Design and undertake independent research to address emerging issues in society and the environment, fostering analytical thinking, ethical research practices, and community engagement.

7. Course Codes:

Sr. No.	Course No.	New Syllabus papers	Credits	Course Codes
Semester - I				
1	MMT-101	Geomorphology	4	MSU0325MMT919G1
2	MMT-102	Principles of Climatology	4	MSU0325MMT919G2
3	MMT-103	Geodesy and Digital Cartography	4	MSU0325MMT919G3
4	MMPR-104	Statistical and Computational Analysis in Geography	2	MSU0325MMP919G1
5	MET-105	Agricultural Geography	4	MSU0325MET919G1
	MET-106	Political Geography	4	MSU0325MET919G2
	MET-107	Economic Geography	4	MSU0325MET919G3
6	RM-108	Research Methodology	4	MSU0325RMP919G
Semester - II				
1	MMT-201	Climate Change and Disaster Management	4	MSU0325MMT919H1
2	MMT-202	Regional Planning and Development	4	MSU0325MMT919H2
3	MMPR-203	Climatic Data Analysis and Visualization	2	MSU0325MMP919H1
4	MET-204	Fundamentals of GIS	4	MSU0325MET919H1
	MET-205	Introduction to Tourism	4	MSU0325MET919H2
5	MEPR-206	Introduction to GIS Software	4	MSU0325MEP919H1
	MEPR-207	Tour Agency Management	4	MSU0325MEP919H2
6	OJT-208	On Job Training	4	MSU0325OJP919H
	FP-209	Field Project	4	MSU0325FPP919H
Semester - III				
1	MMT-301	Geohydrology and Oceanography	4	MSU0325MMT919I1
2	MMT-302	Fundamentals of Remote Sensing and DIP	4	MSU0325MML919I2
3	MMPR-303	Photogrammetry, Remote Sensing and DIP	4	MSU0325MMP919I1
4	MET-304	Population Geography and Human Development	4	MSU0325MET919I1
	MET-305	Tour and Travel Industry	4	MSU0325MET919I2
	MET-306	Urban Geography	4	MSU0325MET919I3
5	MEPR-307	Practical in Population Geography and Human Development	2	MSU0325MEP919I1
	MEPR-308	Travel Agency Management	2	MSU0325MEP919I2
	MEPR-309	Quantitative and Spatial Applications in Urban Geography	2	MSU0325MEP919I3
6	RP-310	Research Project – I	4	MSU0325RPP919I1
Semester - IV				
1	MMT-401	Geographical Thought	4	MSU0325MMT919J1
2	MMT-402	Geography of Environment	4	MSU0325MMT919J2
3	MET-403	Advanced Surveying	4	MSU0325MET919J1
	MET-404	Python Programming and Advanced GIS	4	MSU0325MET919J2
4	MEPR-405	Modern Surveying and Cadastral Mapping	4	MSU0325MEP919J1
	MEPR-406	Python Programming and GIS Analysis	4	MSU0325MEP919J2
5	RP-407	Research Project – II (Dissertation)	6	MSU0325RPP919J1

8. Syllabus:

M.A./M.Sc. Geography (Part II) (Level – 6.5) (Semester III) (NEP – 2020) (Introduced from Academic 2026-27)

Title of Course: Geohydrology and Oceanography

Course Code: MMT-301 (MSU0325MMT91911)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Learn the development of methods of scientific observation in hydrology and Oceanography.
2. Understand the origin, importance, and distribution of water on Earth.
3. Learn about the hydro-geological, coastal, and marine processes, landforms, and resources.
4. Recognize the role of oceans in dealing with the vulnerability of the dynamic Earth system.
5. Comprehend the recent trends in research in Geohydrology and Oceanography.

Unit-1: Groundwater and Basin Hydrology

14 Lectures

Distribution of surface and subsurface water resources on Earth; Hydrological characteristics of aquifers; Groundwater: occurrence, movement, and management; Basin hydrology and hydrological cycle: precipitation, evapotranspiration, infiltration, and run-off; Hydrograph.

Unit-2: Applied Geohydrology

14 Lectures

Groundwater regimes in India and Maharashtra; Groundwater exploration and water pollution with special reference to India; Problems related to water use; Fresh and salt water relationship in coastal areas; Conservation and development of water resources; Watersheds and wetlands in India.

Unit-3: Geological and Biological Oceanography

16 Lectures

Introduction to Oceanography; Origin and evolution of ocean basins; Topography of the ocean floor: continental shelf, slope, rise, submarine channels, hills, ridges, trenches and abyssal plains; Bottom relief of Pacific, Atlantic and Indian Ocean; Origin and evolution of island arcs; Estuarine & coastal processes and landforms; Origin and growth of coral reefs; Ocean deposits: origin, type and distribution.

Unit-4: Physical and Chemical Oceanography

16 Lectures

Oceanic regions; Air-sea interaction and ocean circulation: currents, waves, and tides; Currents of Pacific, Atlantic, & Indian Ocean; Properties of oceanic water: chemical composition, salinity, temperature, and density; Thermohaline circulation and the oceanic conveyor belt; Sea level changes; Marine resources; Marine pollution.

References:

Books & Reports:

1. Cech, T.V. (2009): Principles of Water Resources: History, Development, Management, and Policy (3rd Ed.), Wiley, Hoboken, New Jersey, 576pp.
2. Chow, V.T., Maidment, D.R., and Mays, L.W. (2010): Applied Hydrology, McGraw-Hill, Chennai, 572pp.
3. Christopherson, R.W. (2012): Geosystems: An Introduction to Physical Geography (8th Ed.), Prentice Hall, New Jersey, 693pp.
4. Davie, T., and Quinn, N.W. (2019): Fundamentals of Hydrology (3rd Ed.), Routledge, New York, 285pp.
5. Davis, R., and Fitzgerald, D. (2003): Beaches and Coasts, Wiley-Blackwell, Hoboken, New Jersey, 432pp.
6. Day, T. (2008): Oceans (Rev. Ed.), Facts on File, New York, 337pp.
7. Fitts, C.R. (2002): Groundwater Science, Academic Press, 450pp.

8. Garrison, T. (2009): Essentials of Oceanography (5th Ed.), Brooks/Cole, Belmont, California, 463pp.
9. Garrison, T. and Ellis, R. (2016): Oceanography: An Invitation to Marine Science (9th Ed.), Cengage Learning, Boston, 604pp.
10. Han, D. (2010): Concise Hydrology, Dawai Han and Ventus Publishing, 145pp.
11. Pinder, G.F., and Celia, M.A. (2006): Subsurface Hydrology, Wiley, Hoboken, New Jersey, 485pp.
12. Pinet, P.R. (2009): Invitation to Oceanography (5th Ed.), Jones and Bartlett Publishers, Sudbury, Massachusetts, 609pp.
13. Raghunath, H.M. (2006): Hydrology: Principles, analysis and Design (2nd Ed.), New age International, New Delhi, 477pp.
14. Schwartz, F.W., and Zhang, H. (2002): Fundamentals of Ground Water, Wiley, Hoboken, New Jersey, 592pp.
15. Skinner, B.J., and Murck, B.W. (2011): The Blue Planet: An Introduction to Earth System Science (3rd Ed.), Wiley, Hoboken, New Jersey, pp. 221-319.
16. Sverdrup, K., and Armbrus, V. (2008): Introduction to the World's Oceans (10th Ed.), McGraw-Hill, New York, 528pp.
17. Sverdrup, K.A., and Kudela, R.M (2020): Investigating Oceanography (3rd Ed.), McGraw-Hill, New York, 511pp.
18. Todd, D.K., and Mays, L.W. (2012): Groundwater Hydrology (3rd Ed.), Wiley India, New Delhi, 636pp.
19. Trujillo, A.P., and Thurman, H.V. (2018): Essentials to Oceanography (12th Ed.), Pearson, Boston, 597pp.
20. Viessman, W., and Lewis, G.L. (2002): Introduction to Hydrology (5th Ed.), Prentice Hall, New Jersey, 612pp.

Research Journals:

1. Advances in Water Resources: <https://www.sciencedirect.com/journal/advances-in-water-resources>
2. Annual Review of Marine Science: <https://www.annualreviews.org/journal/marine>
3. Current Science: <https://www.currentscience.ac.in/>
4. Hydrology and Earth System Sciences: <https://www.hydrology-and-earth-system-sciences.net/>
5. Hydrogeology Journal: <https://www.springer.com/journal/10040>
6. ICES Journal of Marine Science: <https://academic.oup.com/icesjms>
7. Indian Journal of Geo-Marine Sciences: <https://or.niscpr.res.in/index.php/IJMS>
8. Journal of Earth System Science: https://www.ias.ac.in/Journals/Journal_of_Earth_System_Science/
9. Journal of Geophysical Research: <https://agupubs.onlinelibrary.wiley.com/journal/21562202>
10. Journal of Hydrology: <https://www.sciencedirect.com/journal/journal-of-hydrology>
11. Journal of Water Resource Planning and Management: <https://ascelibrary.org/journal/jwrm5>
12. Limnology and Oceanography: <https://aslopubs.onlinelibrary.wiley.com/journal/19395590>
13. Nature Geoscience: <https://www.nature.com/ngeo/>
14. Oceanography: <https://www.tos.org/oceanography/>
15. Physics and Chemistry of the Earth: <https://www.sciencedirect.com/journal/physics-and-chemistry-of-the-earth-parts-a-b-c>
16. Progress in Oceanography: <https://www.sciencedirect.com/journal/progress-in-oceanography>
17. Science of the Total Environment: <https://www.sciencedirect.com/journal/science-of-the-total-environment>
18. Water Research: <https://www.sciencedirect.com/journal/water-research>
19. Water Resources Research: <https://agupubs.onlinelibrary.wiley.com/journal/19447973>

Websites:

1. Central Ground Water Board (CGWB), India: <http://cgwb.gov.in/>
2. Central Water Commission, India: <http://cwc.gov.in/>
3. National Ocean Service (NOAA): <https://oceanservice.noaa.gov/>
4. UN Atlas of the Oceans: <http://www.oceansatlas.org/>
5. NCEI-NOAA, Marine Geology & Geophysics: <https://www.ngdc.noaa.gov/mgg/>
6. Indian National Centre for Ocean Information Services: <https://www.incois.gov.in/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Fundamentals of Remote Sensing and DIP

Course Code: MMT-302 (MSU0325MML919I2)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand the principles and concepts of remote sensing and its role in capturing and analyzing Earth's data.
2. Describe the different types of remote sensing platforms, sensors, and image acquisition systems used in the field.
3. Interpret and analyze aerial photographs and satellite images using visual interpretation techniques.
4. Apply digital image processing techniques for feature extraction, including texture, shape, and spectral indices.
5. Explore emerging trends and technologies in remote sensing and digital image processing.

Unit-1: Introduction and Principles of Remote Sensing

20 Lectures

Definition and scope of remote sensing; History and development of remote sensing technology; Electromagnetic radiation (EMR) and electromagnetic spectrum; EMR interaction with atmosphere and earth surface; Atmospheric window and spectral reflectance curve; Resolutions in remote sensing; Types of remote sensing.

Unit-2: Aerial Photography

12 Lectures

Aerial photographs: types, scale and resolution; Types of aerial cameras and photographic films; Geometry of aerial photographs; Parallax, relief displacement, orthophotos; Elements of visual image interpretation.

Unit-3: Satellite Remote Sensing

14 Lectures

Satellite: types and their characteristics; Types of Sensors; Orbital and sensor characteristics of major earth resource satellites: LANDSAT and Sentinel; Recent developments of Indian remote sensing satellite programme.

Unit-4: Digital Image Processing

14 Lectures

Introduction to digital image and image processing; Sources of Errors: Geometric and radiometric; Image rectification; Image classification: supervised and unsupervised; Accuracy assessment.

References:

Books & Reports:

1. Aber, J.S., Marzoff, I., and Ries, J. (2010): Small-Format Aerial Photography: Principles, Techniques and Geoscience Applications, Elsevier, Amsterdam, 268pp.
2. Campbell, J.B., and Wynne, R.H. (2011): Introduction to Remote Sensing (5th Ed.), Guilford Press, New York, 667pp.
3. Jensen, J.R. (2006): Remote Sensing of the Environment: An Earth Resource Perspective (2nd Ed.), Prentice Hall, New Jersey, 608pp.
4. Konecny, G. (2003): Geoinformation: Remote sensing, Photogrammetry and Geographic Information Systems, Taylor & Francis, London, 266pp.
5. Lillesand, T.M., Kiefer, R.W., and Chipman, J.W. (2007): Remote Sensing and Image Interpretation (6th Ed.), Wiley, New Jersey, 804pp.
6. Morgan, D., and Falkner, E. (2001): Aerial Mapping: Methods and Applications (2nd Ed.), CRC Press, Boca Raton, Florida, 216pp.
7. Quattrochi, D.A., and Goodchild, M.F. (1997): Scale in Remote Sensing and GIS, CRC Press, Boca Raton, Florida, 432pp.
8. Reddy, M.A. (2008): Textbook of Remote Sensing and Geographical Information System (3rd Ed.), BS Publications, Hyderabad, 476p
9. Sabins, F.F. (2007): Remote Sensing: Principles and Interpretation (3rd Ed.), Waveland Press, Long Grove, Illinois, 512pp.

10. Schowengerdt, R.A. (2006): Remote Sensing: Models and Methods for Image Processing (3rdEd.), Elsevier, Amsterdam, 560pp.
11. Wolf, P., DeWitt, B., Wilkinson, B. (2012): Elements of Photogrammetry with Application in GIS (4th Ed.), McGraw-Hill, New York, 640pp

Research Journals:

1. Remote Sensing of Environment
2. ASPRS Photogrammetric Engineering and Remote Sensing
3. IJPRS Journal of Photogrammetry and Remote Sensing
4. International Journal of Remote Sensing
5. IEEE Transactions on Geosciences and Remote Sensing
6. IEEE Letters on Geosciences and Remote Sensing
7. Journal of the Indian Society of Remote Sensing

Websites:

1. Indian Space Research Organisation (ISRO), India: <http://www.isro.org>
2. National Remote Sensing Centre (NRSC), India: <http://www.nrsc.gov.in>
3. National Aeronautics and Space Administration (NASA), USA: <http://www.nasa.gov>
4. National Oceanic and Atmospheric Administration (NOAA), USA: <http://www.noaa.gov>
5. United States Geological Survey (USGS), USA: <http://www.usgs.gov>
6. International Society for Photogrammetry and Remote Sensing (ISPRS): <http://www.isprs.org>
7. Wikimapia: <http://www.wikimapia.org>
8. Bhuvan: <http://www.bhuvan.nrsc.gov.in>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Photogrammetry, Remote Sensing and DIP

Course Code: MMPR-303 (MSU0325MMP919I1)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand the fundamental principles and concepts of photogrammetry, remote sensing, and digital image processing.
2. Describe the various sensors, platforms, and techniques used in photogrammetry and remote sensing.
3. Apply photogrammetric techniques to extract three-dimensional information from aerial photographs and digital images.
4. Apply digital image processing techniques for enhancing and analyzing remote sensing data.
5. Apply the knowledge of remote sensing and DIP in various thematic studies

Unit-1: Practical in Photogrammetry

30 Hours

- Exercise-1: Introduction to photogrammetry software
- Exercise-2: Generation of DEM with drone data
- Exercise-3: Conversion of DSM to DTM
- Exercise-4: Area, volume, and contour line generation using DEM
- Exercise-5: Orthophoto generation
- Exercise-6: Close range photogrammetry and 3D model

Unit-2: Practical in Satellite Remote Sensing

30 Hours

- Exercise-7: Introduction to satellite image browsing system
- Exercise-8: USGS Earth Explorer
- Exercise-9: Bhuvan data portal
- Exercise-10: Copernicus Open Access Hub
- Exercise-11: Visual interpretation of satellite images (True Color, FCC and Thermal)

Unit-3: Practical in Google Earth Engine

20 Hours

- Exercise-12: Introduction to Google Earth Engine
- Exercise-13: DEM-based watershed and terrain analysis
- Exercise-14: Remote sensing-based crop/vegetation condition assessment

Unit-4: Practical in DIP

40 Hours

- Exercise-15: Introduction to DIP software
- Exercise-16: Loading of image data, study of histogram and layer information
- Exercise-17: Layer stacking and interpretation of FCC image
- Exercise-18: Supervised classification
- Exercise-19: Unsupervised classification
- Exercise-20: Accuracy assessment

References:

1. American Society of Photogrammetry, (1983). Manual of Remote Sensing, (2nd edition), ASP, Falls Church, Virginia.
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14. Paine, D.P. 1981. Aerial Photography and Image Interpretation for Resource Management. John Wiley & Sons.
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16. Rampal, K.K. 1999. Handbook of Aerial Photography and Interpretation. New Delhi: Concept Publishing Company.
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2. <https://agisoft.freshdesk.com/support/solutions/articles/31000157908-orthomosaic-dem-generation-without-gcps->
3. <https://www.agisoftmetashape.com/3d-mapping-with-agisoft-metashape-the-complete-guide-to->
4. <https://dinosaurpalaeo.wordpress.com/2015/10/11/photogrammetry-tutorial-11-how-to-handle-a-project-in-agisoft-photoscan/>
5. <https://learn.microsoft.com/en-us/dynamics365/mixed-reality/guides/3d-content-guidelines/agisoft-metashape>
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M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Population Geography and Human Development

Course Code: MET-304 (MSU0325MET919I1)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Familiarize with various sources of demographic data in India.
2. Infer factors influencing population distribution.
3. Explore measures of population growth and change.
4. Acquire the skill to analyse and describe population composition and characteristics.
5. Evaluate differences in population policies in developed and developing countries.
6. Obtain expertise to measure human development, social well-being, and quality of life.

Unit - 1: Introduction

10 Lectures

Sources of population data: Census, Sample surveys, and vital statistics; World population growth and distribution: measures, patterns, and determinants.

Unit - 2: Population Dynamics

18 Lectures

Measures of population growth; Trends, patterns, and components of population change: fertility, mortality, and migration; Demographic transition; Malthusian theory of population growth; Ravenstein's laws of migration; Push and pull factors and Everett Lee's theory of migration.

Unit - 3: Population Composition

14 Lectures

Population composition and characteristics: age, sex, rural-urban, occupational structure and educational levels; Spatio-temporal pattern of population composition; Population policies in developed and developing countries.

Unit - 4: Human Development

18 Lectures

Approaches to human development; Measuring human development; Trends and patterns of human development with reference to the world and India; Social well-being and quality of life; Gender equity; Gender Development Index.

References:

Books & Reports:

1. Bhende A., Kanitkar T. (2006): Principles of Population Studies, Himalaya Publishing House, Bombay. 18th revised
2. Bogue, Donald. (1968): Principles of Demography, John Wiley and Sons, Inc. New York
3. Chandana, R.C. (1984): Geography of Population, Kalyani Publisher, Ludhiana.
4. Dyson T. (2010): Population and Development: Demographic Transition. Zed Books Ltd.; 1st edition.
5. Livi-Bacci, M., (1996): A Concise History of World Population (2nd edition), Oxford.
6. Newbold Bruce, K. (2010): Population Geography: Tools and Issues. Rowman& Littlefield Publishers, Inc., UK
7. Newell C. (1990): Methods and Models in Demography. The Guilford Press; 1st edition.
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10. Rowland DT. (2003): Demographic Methods and Concepts. Oxford University Press, USA.
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12. Swanson DA., Siegel JS. (2004): Methods and Materials of Demography. Emerald Group Publishing; 2nd edition.
13. UNDP (United Nations Development Programme) (2025): Human Development Report 2025: A matter of choice: People and possibilities in the age of AI. New York.

14. United Nation (2006): World Population Prospects 2006, Vol I and II.
15. United Nations, (1973): The Determinants and Consequences of Population Trends, Vol. I, Population Studies, No. 50, Chapter VII, New York.
16. United Nations, (1998): Handbook on Civil Registration and Vital Statistics Systems, Management, Operation and Maintenance, New York.
17. United Nations, Department of Economic and Social Affairs, Population Division (2024). World Population Prospects 2024: Methodology of the United Nations population estimates and projections. UN DESA/POP/2024/DC/NO. 10, July 2024.
18. Weeks JR. (2004): Population: An Introduction to Concepts and Issues. Wadsworth Publishing; 9th edition.
19. World Bank 2025: World Development Report: Standards for development, Washington.

Research Journals:

1. Demography: <https://link.springer.com/journal/13524>
2. Geography & Sustainability: <https://www.sciencedirect.com/journal/geography-and-sustainability>
3. Journal of Population Research: <https://link.springer.com/journal/12546>
4. Population Bulletin: <https://www.prb.org/population-bulletins/>
5. Population Development Review: <https://onlinelibrary.wiley.com/loi/17284457>
6. Population Studies: <https://www.tandfonline.com/loi/rpst20>
7. Population, Space, and Place: <https://onlinelibrary.wiley.com/journal/15448452>
8. The Professional Geographer: <https://www.tandfonline.com/loi/rtpg20>
9. World Development: <https://www.sciencedirect.com/journal/world-development>

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1. Census of India: <http://censusindia.gov.in/>
2. Government of India, Civil Registration System <https://dc.crsorgi.gov.in/crs/>
3. Government of India, Vital Statistics Reports: <https://censusindia.gov.in/census.website/data/VSREPORT>
4. National Commission for Women: <http://ncwapps.nic.in/default.aspx>
5. Population Council: <https://www.popcouncil.org/>
6. Population Division of United Nations: <https://www.un.org/en/development/desa/population/index.asp>
7. Population Reference Bureau: www.prb.org
8. The World Bank: www.worldbank.org
9. United Nations Development Program: <http://hdr.undp.org/en/>
10. World Bank: <https://www.worldbank.org/en/publication/wdr/wdr-archive>
11. World Development Reports: <https://www.worldbank.org/en/publication/wdr/wdr-archive>

M.A./M.Sc. Geography (Part II) (Level – 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Tour and Travel Industry

Course Code: MET-305 (MSU0325MET919I2)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. To understand basic concepts in marketing in tourism.
2. To learn about the different marketing strategies of different sectors of tourism.
3. To work efficiently, learn the concept of a travel agency.
4. To understand how to set up a tour and travel agency.
5. To understand how to work in a tour agency.

Unit - 1: Marketing in Tourism

15 Lectures

Concept of Marketing, Marketing Mix, STP, Marketing strategies, Marketing Research, Product design, Branding, New product development, Product life cycle, Internal marketing, Tourism Product Pricing and Distribution: pricing methods, factors, pricing strategies for new/existing tourism products; Price adjustments during peak and off-seasons; Promoting tourism products and distribution channel; Tourism Promotional Tools.

Unit - 2: Marketing Strategies for Different Sectors of Tourism Industry

15 Lectures

Marketing strategies for Airlines, Tour Operators, Hotels; Effectiveness; Role of travel brochures, videos, travel shows; Sales Promotion: techniques and planning; Direct marketing and its characteristics; Destination Marketing; New Product Development.

Unit - 3: Tour Agency

15 Lectures

The elements of tour agency; Tour operators; Organizational structure; Meaning, nature and scope of tour operation; Difference between tour operator and travel agent; Types of tour operators; Diversified role of a tour operator, establishing relationships; Tour planning and tour design: destination research, supplier negotiations, pricing and selling; Pre-tour operational concerns; Tour execution; Post-tour phase-free trips; Hotel procedures; Making tour reservations and payments, confirmation and follow up.

Unit - 4: Travel Agency

15 Lectures

Setting up of a tour and travel agency; Travel information and counselling, reservation, ticketing, documentation, handling business/ corporate clients including conference and conventions; Group travel procedures; Fiscal and non-fiscal incentives available to travel agencies; Sources of income for a travel agent.

References:

1. Swain, S.K. & Mishra, J.M. (2012). Tourism Principles & Practices, Oxford University Press, New Delhi.
2. Bhatia A.K. (2002), International Tourism Management, Sterling Publishers, New Delhi.
3. Robert W. McIntosh, Charles R. Goeldner, J. R. Brent Ritchie (1995) Tourism: Principles, Practices, Philosophies, John Wiley & Sons; 7th Edition
4. Goeldner, C.R. & Brent Ritchie, J.R. (2006). Tourism, Principles, Practices, Philosophies. John Wiley and Sons, New Jersey.
5. Michael M. Coltman. (1989). Introduction to Travel and Tourism- An International Approach. Van Nostrand Reinhold, New York.
6. Roday, S, Biwal. A & Joshi. V. (2009). Tourism Operations and Management, Oxford University Press, New Delhi. 9
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Website:

1. Indian Tourism Development Corporation : <https://itdc.co.in/>
2. World Tourism organisation: <https://www.unwto.org/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Urban Geography

Course Code: MET-306 (MSU0325MET919I3)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand basic concepts, the urbanization process, and important theories of urban geography.
2. Explain the internal structure and land use pattern of cities with simple models.
3. Describe major urban problems of Indian cities and their solutions.
4. Know the important urban planning acts, schemes, and missions in India

Unit - 1: Introduction to Urban Geography and Urbanization

15 Lectures

Meaning, nature, and scope of Urban Geography; Definition and criteria of urban settlements; Census of India classification of towns; Urban agglomeration, conurbation, and megacity; Process of urbanization: meaning and stages; Trends and patterns of urbanization in India; Rank-Size Rule and Primate City concept; Rural-Urban fringe and satellite towns.

Unit - 2: Internal Structure of Cities and Urban Land Use

15 Lectures

Concept of urban morphology; Models of urban structure: Concentric Zone Model (Burgess), Sector Model (Hoyt), and Multiple Nuclei Model (Harris & Ullman); Central Business District (CBD): meaning and characteristics; Major urban land use types; Concept of land use zoning; Floor Space Index (FSI): basic meaning and use.

Unit - 3: Urban Problems in India

15 Lectures

Urban sprawl: meaning, causes, and effects; Housing shortage and slums: causes, problems, and government schemes (Pradhan Mantri Awas Yojana); Urban transport problems: traffic congestion and public transport; Urban flooding and drainage problems; Water supply, sanitation, and solid waste management problems; Urban pollution: air and noise.

Unit - 4: Urban Planning and Government Schemes in India

15 Lectures

Brief history of town planning in India; 74th Constitutional Amendment Act, 1992: main features; Urban Local Bodies: Municipal Corporation and Municipal Council (functions); Development Plan (DP): meaning and contents; Town Planning Scheme (TPS): basic concept; Major urban missions: Smart Cities Mission, AMRUT, Swachh Bharat Mission (Urban); Concept of sustainable city (SDG-11); Role of GIS in modern urban planning; Career opportunities in town planning.

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Books:

1. Brush, J.E. (1968): The Morphology of Indian Cities. In Turner, R. (Ed.), India's Urban Future, University of California Press, Berkeley.
2. Cadwallader, M. (1996): Urban Geography: An Analytical Approach. Prentice Hall, New Jersey, 420 pp.
3. Chandna, R.C. (2014): Geography of Settlement. Kalyani Publishers, New Delhi, 412 pp.
4. Chapin, F.S., and Kaiser, E.J. (1985): Urban Land Use Planning. University of Illinois Press, Champaign.
5. Dear, M., and Flusty, S. (1998): Postmodern Urbanism. Annals of the Association of American Geographers, 88(1), 50–72.
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9. Herbert, D.T. (1972): Urban Geography – A Social Perspective. Praeger, New York, 326 pp.
10. Johnson, J.H. (1972): Urban Geography: An Introductory Analysis. Pergamon Press, Oxford.

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13. Lal, D.S. (2014): Urban Geography. Sharda Pustak Bhawan, Allahabad.
14. Mahajan, B.K. (2010): Urban and Regional Planning. Dhanpatrai, New Delhi.
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16. MoHUA (2021): Urban Planning Capacity in India – A Report. Ministry of Housing and Urban Affairs, Government of India, New Delhi.
17. Pacione, M. (2009): Urban Geography: A Global Perspective. Routledge, London, 688 pp.
18. Sharma, R.C. (2013): Urban Geography. Rawat Publications, Jaipur.
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20. Singh, G. (2006): Urban Geography. Prayag Pustak Bhawan, Allahabad.
21. Short, J.R. (2006): Urban Theory: A Critical Assessment. Palgrave Macmillan, London.
22. Tiwari, R.C. (2012): Geography of Settlements. Prayag Pustak Bhawan, Allahabad.

Reports and Government Documents:

1. Census of India (2011): Primary Census Abstracts – Urban Agglomerations and Towns. Office of the Registrar General & Census Commissioner, New Delhi.
2. Ministry of Housing and Urban Affairs (2022): Annual Report 2022-23. Government of India, New Delhi.
3. TCPO (Town and Country Planning Organisation) (2015): Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines. MoHUA, Government of India.
4. Government of Maharashtra (2020): Mumbai Metropolitan Region Development Plan. MMRDA, Mumbai.
5. TCPD (2021): Directorate of Town and Country Planning, Maharashtra – Annual Report. Government of Maharashtra.

Research Journals:

23. Environment and Planning A: Economy and Space (<https://journals.sagepub.com/home/epn>)
24. International Journal of Urban and Regional Research (<https://onlinelibrary.wiley.com/journal/14682427>)
25. Journal of the American Planning Association (<https://www.tandfonline.com/toc/rjpa20/current>)
26. Urban Studies (<https://journals.sagepub.com/home/usj>)
27. Geoforum (<https://www.sciencedirect.com/journal/geoforum>)
28. Economic and Political Weekly (<https://www.epw.in>)
29. Town and Country Planning (TCPO, New Delhi)

Websites:

1. Census of India Urban Data: <https://censusindia.gov.in>
2. Ministry of Housing and Urban Affairs: <https://mohua.gov.in>
3. Town and Country Planning Organisation: <https://tcpd.gov.in>
4. Smart Cities Mission: <https://smartcities.gov.in>
5. AMRUT Mission: <https://amrut.gov.in>
6. Maharashtra Town Planning: <https://udd.maharashtra.gov.in>
7. National Urban Learning Platform (NURP): <https://nurp.smartnet.in>
8. India Urban Observatory: <https://iuo.datasmartcities.in>

M.A./M.Sc. Geography (Part II) (Level – 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Practical in Population Geography and Human Development

Course Code: MEPR-307 (MSU0325MEP91911)

Total Credits: 02

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Compute population growth, fertility, mortality and literacy rate;
2. Acquire skill to construct, analyze and interpret population composition data;
3. Formulate and analyze aspects of human development, gender development, social well-being and quality of life;
4. Demonstrate population data using geospatial tools.

Practical Exercise(s): Computation, representation and interpretation of population data using MS Excel

Unit-1: Population Data Analysis

30 Hours

Exercise 1: Decadal growth rates, exponential growth rates and doubling time

Exercise 2: Fertility measures (TFR, CBR, ASFR)

Exercise 3: Mortality measures (CDR, ASDR, IMR and MMR)

Exercise 4: Literacy rate (CLR, ELR)

Exercise 5: Population pyramid

Exercise 6: Population composition graphs (gender, education, religion, occupation and rural-urban status)

Unit-2: Analysis of Human Development Indices

30 Hours

Exercise 7: Composite Human Development Index (HDI)

Exercise 8: Health, social and economic well-being using ranking method

Exercise 9: Measuring quality of life

Exercise 10: Gender Development Index (GDI)

Exercise 11: Geospatial mapping of population distribution using QGIS

References:

Books & Reports:

1. Bhende A., Kanitkar T. (2006): *Principles of Population Studies*, Himalaya Publishing House, Bombay. 18th revised
2. Bogue, Donald. (1968): *Principles of Demography*, John Wiley and Sons, Inc. New York
3. Chandana, R.C. (1984): *Geography of Population*, Kalyani Publisher, Ludhiana.
4. Cutts Andrew., Anita Graser, Ivan Ivanov, Eugenia Sarafova (2026): *Learn QGIS*, Packt Publishing, Chicago.
5. Newbold Bruce, K. (2010): *Population Geography: Tools and Issues*. Rowman& Littlefield Publishers, Inc., UK.
6. OECD/European Union/EC-JRC (2008), *Handbook on Constructing Composite Indicators: Methodology and User Guide*, OECD Publishing, Paris.
7. Rowland DT. (2003): *Demographic Methods and Concepts*. Oxford University Press, USA.
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9. Swanson DA., Siegel JS. (2004): *Methods and Materials of Demography*. Emerald Group Publishing; 2nd edition.
10. Toyne Peter., Newby, PT (1971): *Techniques in human geography*, Nelson Thomas Ltd., USA.
11. UNDP (United Nations Development Programme) (2025): *Human Development Report 2025: A matter of choice: People and possibilities in the age of AI*. New York.
12. United Nations, Department of Economic and Social Affairs, Population Division (2024). *World Population Prospects 2024: Methodology of the United Nations population estimates and projections*. UN DESA/POP/2024/DC/NO. 10, July 2024.

13. United Nations, Department of International Economic and Social Affairs, (1984). *Population Projections: Methodology of the United Nations*, Population Studies, No.84, United Nations, New York.
14. World Bank (2025): *World Development Report: Standards for development*, World Bank, Washington.

Research Journals:

1. Demography: <https://link.springer.com/journal/13524>
2. Geography & Sustainability: <https://www.sciencedirect.com/journal/geography-and-sustainability>
3. Journal of Population Research: <https://link.springer.com/journal/12546>
4. Population Bulletin: <https://www.prb.org/population-bulletins/>
5. Population Development Review: <https://onlinelibrary.wiley.com/loi/17284457>
6. Population Studies: <https://www.tandfonline.com/loi/rpst20>
7. Population, Space, and Place: <https://onlinelibrary.wiley.com/journal/15448452>
8. The Professional Geographer: <https://www.tandfonline.com/loi/rtpg20>
9. Human Resource Development International: <https://www.tandfonline.com/journals/rhrd20>

Websites:

1. Census of India: <https://censusindia.gov.in/census.website/en>
2. e-PG Pathshala: <https://epgp.inflibnet.ac.in/>
3. Government of India, Vital Statistics: <https://censusindia.gov.in/census.website/data/VSREPORT>
4. MOOCS - NPTEL: <https://nptel.ac.in/>
5. MOOCS - SWAYAM: <https://swayam.gov.in/>
6. National Commission for Women: <http://ncwapps.nic.in/default.aspx>
7. National Digital Library of India: <https://ndl.iitkgp.ac.in/>
8. Population Council: <https://www.popcouncil.org/>
9. Population Division of United Nations: <https://www.un.org/en/development/desa/population/index.asp>
10. Population Reference Bureau: www.prb.org
11. Shivaji University Library (E-Resources): <http://www.unishivaji.ac.in/library/E-Resources>
12. The World Bank: www.worldbank.org
13. United Nations Development Program (UNDP): <http://hdr.undp.org/en/>
14. World Development Reports: <https://www.worldbank.org/en/publication/wdr/wdr-archive>

M.A./M.Sc. Geography (Part II) (Level – 6.5) (Semester III)
(NEP – 2020)

(Introduced from Academic year 2026-27)

Title of Course: Travel Agency Management

Course Code: MEPR-308 (MSU0325MEP919I2)

Total Credits: 02

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand the work procedure of a travel agency
2. Learn how to prepare documents for travel
3. Develop skills for passport and visa
4. Learn how to provide services
5. Became familiar with marketing skill for travel industry

Unit-1: Passport and Visa

30 Hours

Exercise 1: Fill passport form

Exercise 2: Fill all Annexures and Payment and appointment

Exercise 3: Procedure of Travel Insurance

Exercise 4: Fill visa form for e-visa

Exercise 5: Application for Schengen visa

Unit-2: Ticketing and Hotel Booking

30 Hours

Exercise 6: Train ticketing with IRCTC

Exercise 7: Air Ticket with different apps (Make My Trip, IXIGO, Air Travel)

Exercise 8: Air ticket with software: Amadeus and Galileo

Exercise 9: Procedure for selecting a hotel (from different sources)

Exercise 10: Letter writing for hotel booking and travel agent

Exercise 11: Use of different websites for hotel booking

Exercise 12: Preparation of pamphlets and leaflets for travel agency

Reference:

1. Swain, S.K. & Mishra, J.M. (2012). Tourism Principles & Practices, Oxford University Press, New Delhi.
2. Chand, M. (2002), Travel Agency Management: An Introductory Text, Anmol Publications Pvt. Ltd., New Delhi.
3. Negi, J (2005), Travel Agency Operations: Concepts and Principles, Kanishka, New Delhi.
4. Holloway, J.C. (2002), The Business of Tourism, Prentice Hall, London, pp.220-279.
5. Roday S., Biwal A.& Joshi. V. (2009), Tourism Operations and Management, Oxford University Press, New Delhi, pp-164-296.
5. Goeldner, R & Ritchie. B (2010), Tourism, Principles, Practices and Philosophies, John Wiley & Sons, London.

Websites:

1. IATA: <https://www.iata.org/>
2. Skill development of India : <https://www.nsdindia.org/>
3. IRCTC <https://www.irctc.co.in/nget/train-search>
4. <https://www.makemytrip.com/>
5. <https://www.booking.com/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Quantitative and Spatial Applications in Urban Geography

Course Code: MEPR-309 (MSU0325MEP919I3)

Total Credits: 02

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Classify towns functionally (Location Quotient) and analyze urban size-distribution via the rank-size rule and primate-city index.
2. Measure urban population concentration and inequality
3. Construct choropleth maps to represent urban indicators.
4. Evaluate road-network structure and accessibility using graph-theoretic connectivity indices (Beta) and accessibility matrices.
5. Operate QGIS/ArcGIS to integrate web map service layers, animate time-series data, derive remote-sensing indices (NDVI, NDBI, LST) for urban heat island assessment, and create a classified urban land-use map to serve as a base for urban planning.

Unit 1: Quantitative Analysis of Urban Settlements and Hierarchy

30 Hours

- Exercise 1: Functional classification of towns (Location Quotient-LQ)
Exercise 2: Rank-size rule and primate-city analysis
Exercise 3: Lorenz curve and concentration of urban population
Exercise 4: Decadal growth and pace of urbanization
Exercise 5: Choropleth mapping of urban indicators

Unit 2: Spatial Interaction, Network Connectivity and GIS Applications

30 Hours

- Exercise 6: Working with web map service data using QGIS
Exercise 7: Animating time series data using QGIS
Exercise 8: LST, NDBI, NDVI, and Urban heat island
Exercise 9: Road-network connectivity (graph theory): Beta index
Exercise 10: Accessibility matrix (graph theory)
Exercise 11: Creating an urban landuse map

References:

1. Burrough, P.A. & McDonnell, R.A. (1998). Principles of Geographical Information Systems. Oxford University Press, Oxford.
2. Carter, H. (1995). The Study of Urban Geography (4th ed.). Edward Arnold, London.
3. Chang, K.-T. Introduction to Geographic Information Systems. McGraw-Hill, New York.
4. Christaller, W. (1966). Central Places in Southern Germany (trans. C.W. Baskin). Prentice-Hall, Englewood Cliffs. (foundational for the scalogram / central-place hierarchy exercise)
5. Haggett, P. & Chorley, R.J. (1969). Network Analysis in Geography. Edward Arnold, London. The standard textbook source for the connectivity indices. [Internet ArchiveBiblio](#)
6. Hammond, R. & McCullagh, P.S. (1978). Quantitative Techniques in Geography: An Introduction (2nd ed.). Clarendon Press / Oxford University Press, Oxford. [KabOxford University Press](#)
7. Kansky, K.J. (1963). Structure of Transportation Networks: Relationships between Network Geometry and Regional Characteristics. Research Paper No. 84, Department of Geography, University of Chicago. The original source of the Beta, Alpha, Gamma and Cyclomatic-number indices. [SpringerMst](#)
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9. Mahmood, A. Statistical Methods in Geographical Studies. Rajesh Publications, New Delhi. This text explicitly covers the rank-size rule, gravity/potential models, network analysis and measures of disparity — it maps onto more exercises in your syllabus than any other single book. [AmazonRajesh Publications](#)
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11. Pacione, M. (2009). Urban Geography: A Global Perspective (3rd ed.). Routledge, London.

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13. Singh, R.Y. (1994). Geography of Settlements. Rawat Publications, Jaipur. Amazon

Websites:

Software & GIS tutorials

1. QGIS project (free download): <https://www.qgis.org>
2. QGIS official Training Manual and User Guide: <https://docs.qgis.org> QGIS
3. QGIS Tutorials and Tips (Ujaval Gandhi / Spatial Thoughts): <https://www.qgistutorials.com> Qgis

Indian data sources (for population, decadal growth, town classification, base maps)

1. Census of India / Office of the Registrar General: <https://censusindia.gov.in>
2. Survey of India (topographic base maps): <https://www.surveyofindia.gov.in>
3. Bhuvan – ISRO/NRSC geoportal (satellite data, thematic layers): <https://bhuvan.nrsc.gov.in>
4. Ministry of Housing and Urban Affairs: <https://mohua.gov.in>

Open spatial data (for road networks, accessibility, service areas)

1. OpenStreetMap: <https://www.openstreetmap.org>
2. DIVA-GIS free spatial data: <https://www.diva-gis.org>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester III)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Research Project - I

Course Code: RP-310 (MSU0325RPP919I1)

Total Credits: 04

Course Outcomes (COs): *Upon successful completion of this course, students will be able to:*

1. *Recognize the objectives and significance of research work;*
2. *Formulate research design and methods;*
3. *Organize and carry out field visits, collect field data, and/or conduct a review of literature;*
4. *Effective writing, maintaining research ethics, and academic integrity;*
5. *Preparation and dissemination of research output having scientific and/or social relevance.*

Research Project-I

Research topic should be related to finding, reporting, and/or disseminating geographical knowledge having scientific and/or social relevance.

Total Contact Hours: 120 Hours

Note (s):

1. Projects will be assigned in batches to groups of students.
2. Students are required to select a research topic of geographical importance based on empirical evidence from the literature.
3. They are expected to carry out field work and use primary and/or secondary data, analyze it, and prepare/submit the dissertation/project report for evaluation.
4. Students are also expected to present/publish the research output.
5. Allotment of guides/supervisor (teaching faculty) will be made at the beginning of semester III.

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Geographic Thought

Course Code: MMT-401 (MSU0325MMT919J1)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Acquire knowledge about the historical development of the subject during different time scales.
2. Apprehend the place of geography in social science and natural science.
3. Know the contributions done by Indian scholars.
4. Understand all the concepts of philosophy in geography.
5. Recognize different types of dualism and find solutions to terminate them by applying various types of scientific explanations.
6. Become acquainted with the various perspectives in Geography

Unit-1: Field of Geography

10 Lectures

Definition and meaning of Geography; Field of Geography: its place in social and natural science; Concepts and philosophy of geography: areal differentiation and spatial organization; Changes in major geographic traditions: man-environment relationship, area studies, spatial analysis.

Unit-2: Evolution of Geographical Thought

20 Lectures

Ancient period: Contribution of Greeks, Romans, Indian scholars, Medieval period; Impact of explorations and discoveries; Modern geographical thought: Contributions of Bernhardus Varenius, Alexander Von Humboldt, Carl Ritter, Friedrich Ratzel, Ellen Semple, Fred K. Schaefer, Vidal de la Blache, Carl O. Sauer, and Richard Hartshorne, Impact of Darwinian theory on geographical thought.

Unit-3: Dualism in Geography

10 Lectures

Systematic and regional; Physical and human; Idiographic and nomothetic; Determinism and possibilism.

Unit-4: Scientific Explanations, Paradigm Shift, and Perspectives in Geography

20 Lectures

Scientific Explanations: routes to scientific explanations (inductive/deductive); Types of explanations (cognitive description, cause and effect, temporal); Quantitative revolution; Perspectives: Positivism, Behaviouralism, Humanism, Welfare Geography, Feminism, Gender Geography, and Post-modernism; Recent trends in Geography.

References:

Books & Reports:

1. Adhikari, Sudepta (2015): Fundamentals of Geographical Thought, Orient BlackSwan, New Delhi.
2. Ali S M: The Geography of Puranas, Peoples Publishing House, Delhi, 1966.
3. Amedeo, Douglas (1971): An Introduction to Scientific Reasoning in Geography, John Wiley, U.S.A., 1971.
4. Braithwaite, E.B (1960): Scientific Explanation, Harper Torch Books, New York.
5. Chorley, R.J., and Haggett, P (eds) (1967): Models in Geography, London. Methuen.
6. Dickinson, R.E. (1969): The Makers of Modern Geography, Hall Book Depot, Bhopal, Prentice-Hall of India, New Delhi. (English and Hindi).
7. Dikshit, R. D. (2018): Geographical Thought: A Contextual History of Ideas. PHI Learning, New Delhi.
8. Gold, J.R. (1980): An Introduction to Behavioural Geography, Oxford University Press, Oxford.
9. Hartshorne, R. (1939): The Nature of Geography, Lancaster, Association of American Geographers.
10. Hartshorne, R. (1959): Perspective on the Nature of Geography. Rand McNally, Chicago.
11. Harvey, D. (1969): Explanation in Geography, London, Edward Arnold.
12. Holt Jensen, Arid: (1998) Geography: History and Concepts, Sage Publication, New Delhi.
13. Johnston R. J. & Sidaway, J. D. (2004): Geography and Geographers, 6th Edition, Edward Arnold, London.
14. Johnston, R.J. (1988): The Future of Geography, Methuen, London.

15. Kapur, A. (ed.) (2001): Indian Geography – Voice of Concern. Concept Publishing. Company, New Delhi.
16. Majid, Hussain (1999): Geographic Thought, Rawat Publishing House, Jaipur.
17. Minshull, R.: The Changing Nature of Geography, Hutchinson University Library, London, 1970.
18. Nayak, Anoop and Jeffrey Alex (2011), "Geographical Thought: An Introduction to Ideas in Human Geography", Prentice Hall, Harlow
19. Peet R. And Thirft, N. (Eds.): New Models in Geography, Vo.I&II Unwin Hyman.
20. Peet, R. (1998): Modern Geographical Thought, Blackwell Publishers Inc., Massachusetts.
21. Singh, R. L. and Singh, Rana P.B. (eds.) (1992): The Roots of Indian Geography: Search and Research. National Geographical Society of India, B.H.U., Varanasi, Publication number 39.

Research Journals:

1. Annals, NAGI: <https://sites.google.com/view/nagiorgin/annals-of-nagi>
2. Antipode: <https://onlinelibrary.wiley.com/journal/14678330>
3. Area: <https://rgs-ibg.onlinelibrary.wiley.com/toc/14754762/2026/58/2>
4. National Geographical Society of India (NGS), B.H.U, Varanasi: <https://www.ngji.in>
5. The Geographical Journal: <https://rgs-ibg.onlinelibrary.wiley.com/journal/14754959>
6. Transactions of the Institute of British Geographers: <https://rgs-ibg.onlinelibrary.wiley.com/journal/14755661>
7. Transactions, Institute of Indian Geographers: <https://iigeo.org/>

Journal Articles:

1. **Bunge, W. (1979):** Fred K. Schaefer and the science of Geography, Annals, Association of American Geographers, 69:128-32.
2. **Bunting, T.E, Guelke, L. (1979):** Behavioral and Perception Geography: A Critical Appraisal, Annals, Association of American Geographers, 69:448-62.
3. **Burton, I (1963):** The Quantitative Revolution and Theoretical Geography, The Canadian Geographer 7:151-62.
4. **Fenneman, Nevin M. (1919):** The Circumference of Geography, Annals of the Association of American Geographers, 1919, Vol. 9 (1919), pp. 3- 11.

Websites:

1. <https://epathshala.nic.in/>
2. <https://egyankosh.ac.in>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Geography of Environment

Course Code: MMT-402 (MSU0325MMT919J2)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Learn about the Earth system and its components
2. Learn about the ecosystem concept and its structure
3. Study ecosystem management at the national and international level
4. Study pollution and various legal provisions, laws, rules, and acts for air, water, and noise pollution
5. Understand national and international efforts for the conservation and protection of the environment

Unit-1: Basics of Environment

15 Lectures

Concept of environment; Major elements of environment; Functioning of environmental systems; Role of biotic and abiotic elements; Biodiversity: meaning, and factors influencing biodiversity.

Unit-2: Ecosystems, Biodiversity and Ecosystem Services

15 Lectures

Concept of ecosystem; Ecosystem Geographic Classification (Terrestrial and Aquatic ecosystems): location, types and characteristics; Energy flow in an ecosystem; Food chains, food webs and ecological pyramids; Ecological succession (primary and secondary); Biogeochemical cycles: carbon, nitrogen, oxygen.

Unit-3: Environmental Degradation, Pollution, Hazards and Climate Change

15 Lectures

Environmental degradation and pollution: meaning, sources, types, effects, and control measures for air, water, soil, land, and noise pollution; Natural hazards; Global warming and climate change: causes, evidence, impacts; International programmes and accords (Brundtland Report, Kyoto Protocol, Paris Agreement, SDGs).

Unit-4: Environmental Governance, Policy, Conservation and Sustainability

15 Lectures

Conservation and management of environment; Concept of sustainable development; Environmental Impact Assessment: meaning, importance, and needs; Environmental issues and policies in India; Wildlife management; Solid waste management.

References:

1. Adams, W. M. (2009). Green Development: Environment and Sustainability in a Developing World (3rd ed.). Routledge, London.
2. Berkes, F., & Folke, C. (Eds.). (1998). Linking Social and Ecological Systems. Cambridge University Press, Cambridge.
3. Blaikie, P., & Brookfield, H. (1987). Land Degradation and Society. Methuen, London.
4. Botkin, D. B., & Keller, E. A. (2014). Environmental Science: Earth as a Living Planet (9th ed.). John Wiley & Sons, New York.
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6. Central Pollution Control Board (CPCB): ambient standards and State of Environment reports.
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13. Gautam, A. (2013). Environmental Geography. Sharda Pustak Bhawan, Allahabad.
14. Goudie, A. S. (2018). The Human Impact on the Natural Environment: Past, Present, and Future (8th ed.). Wiley-Blackwell, Oxford.
15. Guha, R. (2000). Environmentalism: A Global History. Oxford University Press, Delhi / Longman.
16. IPBES. (2019). Global Assessment Report on Biodiversity and Ecosystem Services. IPBES Secretariat, Bonn.
17. IPCC. (2023). Climate Change 2023: Synthesis Report (AR6). Intergovernmental Panel on Climate Change, Geneva.
18. Marsh, W. M., & Grossa, J. (2005). Environmental Geography: Science, Land Use, and Earth Systems (3rd ed.). John Wiley & Sons, New York.
19. Millennium Ecosystem Assessment. (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.
20. Miller, G. T., & Spoolman, S. (2012). Living in the Environment: Principles, Connections, and Solutions. Brooks/Cole, Belmont, CA.
21. Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, National Environment Policy, 2006.
22. Odum, E. P., & Barrett, G. W. (2005). Fundamentals of Ecology (5th ed.). Thomson Brooks/Cole, Belmont, CA.
23. Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press, Cambridge.
24. Rangarajan, M. (Ed.). (2007). Environmental Issues in India: A Reader. Pearson Longman, Delhi.
25. Robbins, P. (2020). Political Ecology: A Critical Introduction (3rd ed.). Wiley-Blackwell, Hoboken, NJ.
26. Rockström, J., et al. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472-475.
27. Saxena, H. M. (2017). Environmental Geography. Rawat Publications, Jaipur/New Delhi.
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29. Smith, K., Fearnley, C. J., Dixon, D., Bird, D. K., & Kelman, I. (2024). Environmental Hazards: Assessing Risk and Reducing Disaster (7th ed.). Routledge, London.
30. Steffen, W., et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
31. The Environment (Protection) Act, 1986, and the EIA Notifications (1994; 2006, as amended).
32. The Water (Prevention and Control of Pollution) Act, 1974; The Air (Prevention and Control of Pollution) Act, 1981.
33. The Wildlife (Protection) Act, 1972; The Forest (Conservation) Act, 1980; The Biological Diversity Act, 2002; The National Green Tribunal Act, 2010.
34. Turner, B. L., Clark, W. C., Kates, R. W., Richards, J. F., Mathews, J. T., & Meyer, W. B. (Eds.). (1990). The Earth as Transformed by Human Action. Cambridge University Press, Cambridge.
35. UNEP: Global Environment Outlook (GEO) series, United Nations Environment Programme.
36. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At Risk: Natural Hazards, People's Vulnerability and Disasters (2nd ed.). Routledge, London.

Websites:

1. Global Environmental Change: <https://www.sciencedirect.com/journal/global-environmental-change>
2. Environment and Urbanization: <https://journals.sagepub.com/home/eau>
3. Urban Geography: <https://www.tandfonline.com/journals/rurb20>
4. Geoforum: <https://www.sciencedirect.com/journal/geoforum>
5. Ecological Economics: <https://www.sciencedirect.com/journal/ecological-economics>
6. Environmental Management: <https://link.springer.com/journal/267>
7. Economic & Political Weekly (EPW): <https://www.epw.in/>
8. Bhuvan (NRSC-ISRO): <https://bhuvan.nrsc.gov.in/>
9. USGS Earth Explorer: <https://earthexplorer.usgs.gov/>
10. CPCB (Central Pollution Control Board): <https://cpcb.nic.in/> — CPCB's air quality data is also accessible via CAAQMS portal: <https://airquality.cpcb.gov.in/>
11. SAFAR (System of Air Quality and Weather Forecasting and Research): <http://safar.tropmet.res.in/>
12. IMD (India Meteorological Department): <https://mausam.imd.gov.in/>
13. Census of India: <https://censusindia.gov.in/>
14. MoEFCC (Ministry of Environment, Forest and Climate Change): <https://moef.gov.in/>
15. IPCC (Intergovernmental Panel on Climate Change) data: <https://www.ipcc.ch/> (Data Distribution Centre: <https://www.ipcc-data.org/>)
16. IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services): <https://www.ipbes.net/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Advanced Surveying

Course Code: MET-403 (MSU0325MET919J1)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand the fundamental principles, methods, and applications of surveying.
2. Apply modern surveying instruments and techniques for geospatial data collection.
3. Perform GNSS-based surveys and establish geodetic control for mapping and navigation.
4. Conduct cadastral surveys and prepare cadastral maps using contemporary surveying technologies.
5. Process, analyze, and assess survey data for land administration and geospatial applications.

Unit-1: Fundamentals of Surveying

12 Lectures

Principles and classification of surveying; Errors and accuracy in surveying; Measurement of distances and angles; Traversing, triangulation, and trilateration; Levelling and contouring; Applications of surveying in geospatial studies.

Unit-2: Modern Surveying Techniques

15 Lectures

EDM and digital levelling principles; Total Station surveying; UAV-based surveying and mapping; LiDAR and mobile mapping systems; Survey data processing, Accuracy assessment, and emerging trends in surveying.

Unit-3: GNSS and Geodetic Surveying

15 Lectures

Principles and components of GNSS; Satellite navigation systems including GPS, GLONASS, Galileo, BeiDou, and NavIC; GNSS positioning techniques; DGPS surveying; Static and kinematic surveying methods; Applications of GNSS in mapping, surveying, navigation, and geospatial data collection.

Unit-4: Cadastral Survey in India

18 Lectures

Concept, objectives, and significance of cadastral surveying; Cadastral systems and land administration framework in India; Types and components of cadastral maps and land records; Principles and procedures of cadastral survey; Accuracy standards and sources of errors in cadastral surveys; Concept of digital cadastral mapping, Applications of cadastral databases in land management and planning.

References:

Books:

1. Kavanagh, B.F. and Bird, S.J. (2019): Surveying: Principles and Applications, Pearson Education.
2. Bolstad, P. (2019): GIS Fundamentals: A First Text on Geographic Information Systems, XanEdu Publishing.
3. Ghilani, C.D. and Wolf, P.R. (2018): Elementary Surveying: An Introduction to Geomatics, Pearson Education.
4. Shan, J. and Toth, C.K. (2018): Topographic Laser Ranging and Scanning: Principles and Processing, CRC Press.
5. Van Sickle, J. (2015): GPS for Land Surveyors, CRC Press.
6. Leick, A., Rapoport, L. and Tatarnikov, D. (2015): GPS Satellite Surveying, Wiley.
7. Colomina, I. and Molina, P. (2014): Unmanned Aerial Systems for Photogrammetry and Remote Sensing, ISPRS Journal.
8. Uren, J. and Price, W.F. (2010): Surveying for Engineers, Palgrave Macmillan.
9. Hofmann-Wellenhof, B., Lichtenegger, H. and Waskle, E. (2008): GNSS – Global Navigation Satellite Systems: GPS, GLONASS, Galileo and More, Springer.
10. Schofield, W. and Breach, M. (2007): Engineering Surveying, Butterworth-Heinemann, Oxford.

11. Mikhail, E.M., Bethel, J.S. and McGlone, J.C. (2001): Introduction to Modern Photogrammetry, Wiley.
12. Bannister, A., Raymond, S. and Baker, R. (1998): Surveying, 7th Edition, Pearson Education, London.

Research Journals:

1. *Journal of Surveying Engineering* (ASCE)
2. *Survey Review*
3. *Journal of Geodesy*
4. *GPS Solutions*
5. *International Journal of Remote Sensing*
6. *ISPRS Journal of Photogrammetry and Remote Sensing*
7. *Remote Sensing*
8. *Geocarto International*
9. *Journal of Spatial Science*
10. *Geomatics, Natural Hazards and Risk*

Websites:

1. Survey of India – <https://surveyofindia.gov.in>
2. Indian Space Research Organisation (ISRO) – <https://www.isro.gov.in>
3. Indian Regional Navigation Satellite System (NavIC) – <https://www.isro.gov.in/Navigation.html>
4. National Remote Sensing Centre (NRSC) – <https://www.nrsc.gov.in>
5. United Nations Global Navigation Satellite Systems – <https://www.unoosa.org>
6. International Federation of Surveyors (FIG) – <https://www.fig.net>
7. International GNSS Service (IGS) – <https://igs.org>
8. Open Geospatial Consortium (OGC) – <https://www.ogc.org>
9. International Society for Photogrammetry and Remote Sensing (ISPRS) – <https://www.isprs.org>
10. Bureau of Indian Standards (BIS) – <https://www.bis.gov.in>
11. [Department of Land Resources \(DILRMP\)](#)
12. [ISRO – NavIC Programme](#)
13. [International Federation of Surveyors \(FIG\)](#)

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Python Programming and Advanced GIS

Course Code: MET-404 (MSU0325MET919J2)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Understand the fundamentals of Python programming, data types, operators, and control statements.
2. Develop Python programs using functions, object-oriented programming concepts, file handling, and exception handling techniques.
3. Apply Python programming skills to solve computational and data processing problems efficiently.
4. Utilize Python and GIS libraries such as ArcPy, GDAL, GeoPandas, and NumPy for geospatial analysis, raster-vector processing, and map automation.

Unit-1: Introduction to Python Programming

20 Lectures

Introduction to programming languages; Programming language types; Introduction to number system; ASCII Code; History and features of Python; Python syntax and structure; Variables and data types; Input and output functions; Application of Python.

Unit-2: Operators and Control Statements

15 Lectures

Arithmetic and assignment operators; Comparison and logical operators; Conditional statements (if, if-else, elif); Looping statements (for, while, nested, infinite loop); Break, continue, and pass statements; Error in Python programming.

Unit-3: Functions and Introduction to OOP

10 Lectures

Introduction to functions; User-defined functions; Function arguments and return values; Concept of file handling; Reading and writing files; Exception handling; Modules in Python; Introduction to object-oriented programming (OOP).

Unit-4: Python for GIS

15 Lectures

Introduction to Python in GIS; Introduction to geoprocessing tools in Python; Automation of GIS Tasks using Python; Batch processing; Introduction to python libraries for GIS: ArcPy, GDAL, Geopandas, NumPy; Applications of python in GIS; Emerging trends in python and geospatial technology.

References:

1. Paul A. Zandbergen (2020) Python Scripting for ArcGIS Pro, ESRI Press.
2. Paul A. Zandbergen (2020) Advanced Python Scripting for ArcGIS Pro, ESRI Press.
3. Eric Pimpler (2015). Programming ArcGIS with Python Cookbook, Packt Publishing Limited; 2nd edition.
4. Laura Tateosian (2018). Python for ArcGIS. Springer.
5. Silas Toms, and Dara O'Beirne (2017). ArcPy and ArcGIS -: Automating ArcGIS for Desktop and ArcGIS Online with Python, Packt Publishing Limited; 2nd edition.

Websites:

1. <https://pro.arcgis.com/en/pro-app/latest/arcpy/get-started/installing-python-for-arcgis-pro.htm>
2. <https://www.esri.com/en-us/arcgis/products/arcgis-python-libraries/overview>
3. <https://www.esri.com/training/catalog/60db423e8b20f13a5ac9cc09/working-with-raster-data-using-python/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Modern Surveying and Cadastral Mapping

Course Code: MEPR-405 (MSU0325MEP919J1)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Operate modern surveying instruments for field data collection.
2. Perform topographic, traverse, GNSS, and cadastral surveys.
3. Acquire and process geospatial data using Total Station, DGPS, UAV, and GIS technologies.
4. Prepare topographic and cadastral maps using modern surveying techniques.
5. Develop GIS-based cadastral databases for land administration and geospatial applications.

Unit-1: Theodolite and Levelling Surveys

30 Hours

Exercise 1: Measurement of horizontal and vertical angles using a Theodolite

Exercise 2: Tachometric survey for determination of distances and elevations

Exercise 3: Contour survey and preparation of contour maps using levelling data

Unit-2: Total Station Surveys

30 Hours

Exercise 4: Topographic survey using Total Station

Exercise 5: Traverse survey and coordinate computation using Total Station

Exercise 6: Stake-out survey and downloading, processing, and plotting of Total Station data

Unit-3: GNSS and UAV Surveys

30 Hours

Exercise 7: Collection of waypoint and track data using GPS

Exercise 8: Collection of Ground Control Points (GCPs) using DGPS

Exercise 9: UAV mission planning, image acquisition, and generation of Orthophoto and DEM

Unit-4: Cadastral Survey and GIS Applications

30 Hours

Exercise 10: Interpretation of cadastral maps, survey numbers, FMB, and RoR

Exercise 11: Parcel boundary survey using Total Station/DGPS and preparation of a cadastral sketch

Exercise 12: Georeferencing of village cadastral maps using GIS

Exercise 13: Digitization of parcel boundaries and preparation of digital cadastral maps

Exercise 14: Integration of FMB/RoR data with cadastral parcels and creation of a cadastral GIS database

References:

1. Bannister, A., Raymond, S., and Baker, R. (1998): Surveying (7th Edition), Pearson Education, London.
2. Bolstad, P. (2019): GIS Fundamentals: A First Text on Geographic Information Systems, XanEdu Publishing.
3. Colomina, I. and Molina, P. (2014): Unmanned Aerial Systems for Photogrammetry and Remote Sensing, ISPRS Journal.
4. Ghilani, C.D. and Wolf, P.R. (2018): Elementary Surveying: An Introduction to Geomatics, Pearson Education.
5. Hofmann-Wellenhof, B., Lichtenegger, H. and Wasle, E. (2008): GNSS – Global Navigation Satellite Systems.
6. Kavanagh, B.F. and Bird, S.J. (2019): Surveying: Principles and Applications, Pearson Education.
7. Leick, A., Rapoport, L. and Tatarnikov, D. (2015): GPS Satellite Surveying, Wiley.
8. Mikhail, E.M., Bethel, J.S. and McGlone, J.C. (2001): Introduction to Modern Photogrammetry, Wiley.
9. Schofield, W. and Breach, M. (2007): Engineering Surveying, Butterworth-Heinemann.
10. Shan, J. and Toth, C.K. (2018): Topographic Laser Ranging and Scanning, CRC Press.
11. Uren, J. and Price, W.F. (2010): Surveying for Engineers, Palgrave Macmillan.
12. Van Sickle, J. (2015): GPS for Land Surveyors, CRC Press.

Research Journals:

1. *Journal of Surveying Engineering*
2. *Survey Review*
3. *Journal of Geodesy*

4. GPS Solutions
5. ISPRS Journal of Photogrammetry and Remote Sensing
6. Remote Sensing
7. Geocarto International
8. International Journal of Geographical Information Science
9. Photogrammetric Engineering and Remote Sensing
10. Geomatics, Natural Hazards and Risk

Websites:

1. [Survey of India](#)
2. [Indian Space Research Organisation \(ISRO\)](#)
3. [National Remote Sensing Centre \(NRSC\)](#)
4. [NavIC – Indian Regional Navigation Satellite System](#)
5. [International GNSS Service \(IGS\)](#)
6. [International Federation of Surveyors \(FIG\)](#)
7. [International Society for Photogrammetry and Remote Sensing \(ISPRS\)](#)
8. [Open Geospatial Consortium \(OGC\)](#)
9. [Bureau of Indian Standards \(BIS\)](#)
10. [United Nations Office for Outer Space Affairs \(GNSS Portal\)](#)

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)
(Introduced from Academic year 2026-27)

Title of Course: Python Programming and GIS Analysis

Course Code: MEPR-406 (MSU0325MEP919J2)

Total Credits: 04

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. To understand the fundamentals of Python programming and object-oriented concepts.
2. To develop Python programs using conditional statements, loops, functions, and file handling techniques.
3. To apply Python scripting and ArcPy tools for geoprocessing and spatial data analysis in GIS.
4. To perform spatial data manipulation, raster processing, and map designing using Python in GIS applications.

Unit-1: Introduction to Python Programming

30 Hours

- Exercise 1: Working with Python editors (IDEs)
- Exercise 2: Variables in Python
- Exercise 3: Operators in Python
- Exercise 4: Data types in Python

Unit-2: Statements and Functions in Python

30 Hours

- Exercise 5: Conditional statements
- Exercise 6: Looping statements
- Exercise 7: Functions in Python
- Exercise 8: File handling (I/O)
- Exercise 9: Debugging and error handling in Python

Unit-3: Introduction to Arc- GIS Software

20 Hours

- Exercise 10: Introduction to ArcGIS software
- Exercise 11: Geoprocessing in ArcGIS using GUI
- Exercise 12: Map layout in Arc GIS

Unit-4: GIS Analysis using Python

40 Hours

- Exercise 13: Import ArcPy and ArcGIS environment setting
- Exercise 14: Geoprocessing using python scripting (Clip, Intersect, Buffer)
- Exercise 15: Working with vector data using python
- Exercise 16: Working with raster data using python
- Exercise 17: Map scripting and map designing using python

References:

1. John Jelle (2016) Python Programming: An Introduction to Computer Science, Franklen Beedle.
2. Paul A. Zandbergen (2020) Python Scripting for ArcGIS Pro, ESRI Press.
3. Paul A. Zandbergen (2020) Advanced Python Scripting for ArcGIS Pro, ESRI Press.
4. Eric Pimpler (2015). Programming ArcGIS with Python Cookbook, Packt Publishing Limited; 2nd edition.
5. Laura Tateosian (2018). Python For ArcGIS. Springer.
6. Silas Toms, and Dara O'Beirne (2017). ArcPy and ArcGIS -: Automating ArcGIS for Desktop and ArcGIS Online with Python, Packt Publishing Limited; 2nd edition.

Websites:

1. <https://www.python.org/about/gettingstarted/>
2. <https://www.w3schools.com/python/>
3. <https://nptel.ac.in/courses/106106212>
4. <https://pro.arcgis.com/en/pro-app/latest/arcpy/get-started/installing-python-for-arcgis-pro.htm>
5. <https://www.esri.com/training/catalog/60db423e8b20f13a5ac9cc09/working-with-raster-data-using-python/>

M.A./M.Sc. Geography (Part II) (Level - 6.5) (Semester IV)
(NEP – 2020)

(Introduced from Academic year 2026-27)

Title of Course: Research Project – II (Dissertation)

Course Code: RP-407 (MSU0325RPP919J1)

Total Credits: 06

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

1. Recognize the objectives and significance of research work.
2. Formulate research design and methods.
3. Organize and carry out field visits, collect field data, and/or conduct a review of literature.
4. Effective writing, maintaining research ethics and academic integrity.
5. Preparation and dissemination of research output having scientific and/or social relevance.
6. Assimilate cultural, economic and environmental diversity encountered during study tour / Geographical Excursion.

Unit-1: Research Project – II

150 Hours

Research topic should be related to finding, reporting and/or disseminating geographical knowledge having scientific and/or social relevance.

Unit-2: Study Tour / Geographical Excursion

30 Hours

Study tours and visits to places with important geographical features/ landforms and/or social & cultural relevance.

Total Contact Hours: 180 Hours.

Note (s):

1. Research topic and work for Research Project- II (Dissertation) must be different for each student.
2. Students are required to select a research topic of geographical importance, supported by empirical evidence from the literature.
3. They are expected to carry out field work and use primary and/or secondary data, analyze it and prepare / submit the dissertation/project report for evaluation.
4. Students are also expected to present / publish the research output.
5. Allotment of guides / supervisor (teaching faculty) will be made at the end of the semester III.

9.Scheme of Teaching: Scheme of teaching and time table for lectures, tutorials and practical's will be notified before start of every semester.

10.Examination Pattern and Requirement before appearance for University Assessment:

Course Type	Total Marks	University Assessment Marks	Internal Assessment Marks	During University Assessment		
				Journal	Project Reports	Study Tour Report
Theory	100	60	40	--	--	--
Practical – 4 Credits	100	60	40	Mandatory	--	--
Practical – 2 Credits	50	30	20	Mandatory	--	--
On Job Training – 4 Credits	100	100	--	--	Mandatory	--
Field Project – 4 Credits	100	100	--	--	Mandatory	--
Research Project – 4 Credits	100	100	--	--	Mandatory	--
Research Project – 6 Credits	150	150	--	--	Mandatory	Mandatory

11.Nature of Question Paper and Scheme of Marking for University and Internal Assessment:

2 (a). Nature of Theory Question Paper (60 Marks):

Question No.	Type of Question (Word limit)	Number of Questions to be Asked	Number of Questions to be Answered	Marks per Question	Total Marks
Q1.	Long Answer/ Essay type	02	01	12	12
Q2.	Long Answer/ Essay type	02	01	12	12
Q3.	Long Answer/ Essay type	02	01	12	12
Q4.	Long Answer/ Essay type	02	01	12	12
Q5.	Short Answer	06	04	03	12
Total = 05	--	--	--	--	60

2 (b). The outline for continuous internal assessment activities of Theory Paper (40 Marks):

Level	Semester	Internal Assessment	Marks	
			4 Credits (100 Marks)	2 Credits (50 Marks)
6.0 First Year	I and II	1. Seminar	10	5
		2. Case study/ Problem Solving	10	5
		3. Book review/ Poster Presentation	10	5
		4. Midterm test	10	5
6.5 Second Year	III and IV	1. Group Discussion	10	5
		2. Research paper review	10	5
		3. Open book examination	10	5
		4. Midterm test	10	5

2 (c). Nature of Practical Question Paper for Major Practical (100 Marks) Assessment:

Question No.	Type of Question/ Assessment	Marks (60 marks)
Q1	Practical/ Lab Assessment	20
Q2	Practical/ Lab Assessment	20
Q3	Practical/ Lab Assessment	10
Q4.	Practical/ Lab Assessment	10
Total = 04	--	60

2 (d). Nature of Practical Question Paper for Minor Practical (50 Marks) Assessment

Question No.	Type of Question/ Assessment	Marks (30 Marks)
Q1.	Practical/ Lab Assessment	16
Q2.	Practical/ Lab Assessment	08
Q3.	Practical/ Lab Assessment	06
Total = 03	--	30

2(e). The outline for continuous internal assessment activities of Practical Paper (40 /20 Marks)

Level	Semester	Internal Assessment	Marks	
			4 Credits (100 Marks)	2 Credits (50 Marks)
6.0 First Year 6.5 Second Year	I,II,III and IV	1. Journal	10	5
		2. Attendance	10	5
		3. Oral	10	5
		4. *Report/ Seminar/ Model etc.	10	5
		Total	40	20

2 (f). Scheme of Examination for On Job Training (100 Marks)

After successful completion of On Job Training (OJT) the assessment for 100 marks shall be done by

External and Internal Examiners as under:

Sr. No.	Particular	Marks
1	Quality and effectiveness of presentation	10
2	Depth of knowledge and demonstration skills	10
3	Variety and relevance of learning experience	10
4	Practical applications and relationships with concepts taught	10
5	Internship Report	30
6	Attendance record, student log, supervisor evaluation	30
	Total	100

2 (g). Scheme of Examination for Research Project –I (100 Marks), Research Project –II / Dissertation (150 Marks), and Field Project (100 Marks) by External and Internal Examiners as under:

Sr. No.	Particular	100 Marks	150 Marks
1	Quantum and quality of work	25	40
2	Presentation	25	40
3	Report	25	35
4	Oral/ Discussion/ Question-answer, etc.	25	35

12. Equivalence of Courses

M.A./M. Sc. Geography Part I & Part II (Semester I, II, III, and IV)

Old Course			Equivalent Course		
Course No.	Course Title	Credits	Course No.	Course Title	Credits
MMT-101	Geomorphology	4	MMT-101	Geomorphology	4
MMT-102	Principles of Climatology	4	MMT-102	Principles of Climatology	4
MMT-103	Economic Geography	4	MET-107	Economic Geography	4
MMPR-104	Computer Applications in Geography	2	MMPR-104	Statistical and Computational Analysis in Geography	2
MET-105	Population Geography and Human Resource Development	4	MET-304	Population Geography and Human Development	4
MET-106	Settlement Geography	4	--	--	--
MET-107	Geography of Health and Nutrition	4	--	--	--
RM-108	Research Methodology in Geography	4	RM-108	Research Methodology	4
MMT-201	Advanced Cartography and Surveying	4	MMT-103	Geodesy and Digital Cartography	4
MMT-202	Climate Change and Disaster Management	4	MMT-201	Climate Change and Disaster Management	4
MMPR-203	Advanced Surveying	4	MEPR-405	Modern Surveying and Cadastral Mapping	4
MET-204	Fundamentals and Applications of GIS and GPS	4	MET-204	Fundamentals of GIS	4
MET-205	Fundamentals of Soil Geography	4	--	--	--
MET-206	Tourism Geography	4	MET-205	Introduction to Tourism	4
MEPR-207	Introduction to GIS Software and GPS	4	MEPR-206	Introduction to GIS Software	4
MEPR-208	Soil and Water Analysis	4	--	--	--
MEPR-209	Practical in Tourism Geography	4	MEPR-207	Tour Agency Management	4
OJT-210	On Job Training	4	OJT-208	On Job Training	4
FP-210	Field Project	4	FP-209	Field Project	4
MMT-301	Geohydrology and Oceanography	4	MMT-301	Geohydrology and Oceanography	4
MMT-302	Fundamentals of Remote Sensing and DIP	4	MMT-302	Fundamentals of Remote Sensing and DIP	4
MMPR-303	Photogrammetry, Remote Sensing and DIP	4	MMPR-303	Photogrammetry, Remote Sensing and DIP	4
MMPR-304	Statistical Techniques in Geography	2	--	--	2
MET-305	Biogeography	4	--	--	--
MET-306	Geography of Environment	4	MMT-402	Geography of Environment	4
MET-307	Political Geography	4	MET-106	Political Geography	4
RP-308	Research Project – I	4	RP-310	Research Project – I	4
MMT-401	Regional Planning and Development	4	MMT-202	Regional Planning and Development	4
MMT-402	Development of Geographical Thought	4	MMT-401	Geographical Thought	4

MET-403	Agricultural Geography	4	MET-105	Agricultural Geography	4
MET-404	Geography of Resources	4	--	--	
MET-405	Social and Cultural Geography	4	--	--	
MEPR-406	Data Representation Methods – Physical Geography	4	--	--	
MEPR-407	Data Representation Methods – Human Geography	4	--	--	
RP-408	Research Project – II (Dissertation)	6	RP-407	Research Project – II (Dissertation)	6
			MMPR-203	Climatic Data Analysis and Visualization	2
			MET-305	Tour and Travel Industry	4
			MET-306	Urban Geography	4
			MEPR-307	Practical in Population Geography and Human Development	2
			MEPR-308	Travel Agency Management	2
			MEPR-309	Quantitative and Spatial Applications in Urban Geography	2
			MET-403	Advanced Surveying	4
			MET-404	Python Programming and Advanced GIS	4
			MEPR-406	Python Programming and GIS Analysis	4

M.A/M.Sc. Geography Part-II Revised Syllabus (From Academic Year 2026-27)

Sr. No.	Course No.	New Syllabus papers	Credits	Course Codes
Semester - III				
1	MMT-301	Geohydrology and Oceanography	4	MSU0325MMT919I1
2	MMT-302	Fundamentals of Remote Sensing and DIP	4	MSU0325MML919I2
3	MMPR-303	Photogrammetry, Remote Sensing and DIP	4	MSU0325MMP919I1
4	MET-304	Population Geography and Human Development	4	MSU0325MET919I1
	MET-305	Tour and Travel Industry	4	MSU0325MET919I2
	MET-306	Urban Geography	4	MSU0325MET919I3
5	MEPR-307	Practical in Population Geography and Human Development	2	MSU0325MEP919I1
	MEPR-308	Travel Agency Management	2	MSU0325MEP919I2
	MEPR-309	Quantitative and Spatial Applications in Urban Geography	2	MSU0325MEP919I3
6	RP-310	Research Project – I	4	MSU0325RPP919I1
Semester - IV				
1	MMT-401	Geographical Thought	4	MSU0325MMT919J1
2	MMT-402	Geography of Environment	4	MSU0325MMT919J2
3	MET-403	Advanced Surveying	4	MSU0325MET919J1
	MET-404	Python Programming and Advanced GIS	4	MSU0325MET919J2
4	MEPR-405	Modern Surveying and Cadastral Mapping	4	MSU0325MEP919J1
	MEPR-406	Python Programming and GIS Analysis	4	MSU0325MEP919J2
5	RP-407	Research Project – II (Dissertation)	6	MSU0325RPP919J1

M.A/M.Sc. Geography Part-II Old Syllabus (From Academic Year 2022-23)

Sr. No.	Course No.	Course Title	Credits	Course Codes
Semester - I				
Semester - III				
1	MMT-301	Geohydrology and Oceanography	4	MSU0325MML19I1
2	MMT-302	Fundamentals of Remote Sensing and DIP	4	MSU0325MML19I2
3	MMPR-303	Photogrammetry, Remote Sensing and DIP	4	MSU0325MMP19I1
4	MMPR-304	Statistical Techniques in Geography	2	MSU0325MMP19I2
5	MET-305	Biogeography	4	MSU0325MET19I1
	MET-306	Geography of Environment	4	MSU0325MET19I2
	MET-307	Political Geography	4	MSU0325MET19I3
6	RP-308	Research Project – I	4	MSU0325RPP19I1
Semester - IV				
1	MMT-401	Regional Planning and Development	4	MSU0325MML19J1
2	MMT-402	Development of Geographical Thought	4	MSU0325MML19J2
3	MET-403	Agricultural Geography	4	MSU0325MEL19J1
	MET-404	Geography of Resources	4	MSU0325MEL19J2
	MET-405	Social and Cultural Geography	4	MSU0325MEL19J3
4	MEPR-406	Data Representation Methods – Physical Geography	4	MSU0325MEP19J1
	MEPR-407	Data Representation Methods – Human Geography	4	MSU0325MEP19J2
5	RP-408	Research Project – II (Dissertation)	6	MSU0325RPP19J1