INDEX

DEPARTMENT OF GEOGRAPHY

Semester-III

S.No.	Contents	Page No.
1	**BA (Hons.) GEOGRAPHY - DSC** 1. CLIMATOLOGY 2. URBAN GEOGRAPHY 3. FUNDAMEMNTALS OF REMOTE SENSING (PRACTICAL)	**2-7**
2	**BA (Prog) with Geography as Major** 1. CLIMATOLOGY **2.** URBAN GEOGRAPHY	**8-11**
3	**BA (Prog) with Geography as Non-Major** 1. CLIMATOLOGY	**12-13**
4	**Pool of Discipline Specific Electives** 1. BIOGEOGRAPHY **2.** GEOGRAPHY OF ARID AND SEMI-ARID REGION	**14-17**
5	**Common Pool of Generic Elective** 1. CONTEMPORARY ENVIRONMENTAL ISSUES 2. GEOGRPHY OF TOURISM 3. SPATIAL INFORMATION TECHNOLOGY	**18-23**

CATEGORY -I
BA (HONS. GEOGRAPHY

DISCIPLINE SPECIFIC CORE COURSE – 07 (DSC-07): CLIMATOLOGY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
CLIMATOLOGY	4	3	1	-	12th pass	-

Learning Objectives

The Learning Outcomes of this course are as follows:

- Explaining various dimensions of climatology
- Analysing atmospheric moisture along with disturbances
- An understanding world climatic regions

Learning outcomes

The Learning Outcomes of this course are as follows:

- Detailed exposure to climatology.
- In-depth knowledge of atmospheric moisture and cyclonic features.
- Knowledge of the mechanism of monsoon and climatic classification.

SYLLABUS OF DSC-07

Unit-I: Introduction: **(2hrs)**

- Nature, Scope, and Application

Unit-II: Atmospheric Moisture (12hrs)

- Humidity-types, Evapotranspiration, Condensation- process and forms (a. clouds, and b. fog), Precipitation- forms and types, Atmospheric Stability and Instability.(10hrs)

Unit-III: Atmospheric Disturbances: (12hrs)

- Tropical Cyclones- Characteristics, Mechanism and Distribution.
- Temperate Cyclones- Characteristics, Mechanism (Polar Front Theory) and Distribution.(

Unit-IV: Monsoon (10hrs)

- Mechanism of monsoon.

- Global teleconnections in relation to monsoon in India, ENSO, Indian Ocean Dipole Effect.
- Jet Streams and Monsoon in India.

Unit-V: Climatic Classification (9hrs)

- Concept and Purpose of Classification.
- Koppen's Classification.

Suggestive Readings

1. Frederick K. Lutgens, Edward J. Tarbuck, Dennis G. Tasa (2015) The Atmosphere: An Introduction to Meteorology, Pearson Education

2. Barry R. G. and Carleton A. M. (2001) Synoptic and Dynamic Climatology, Routledge, UK. 2

3. Barry R. G. and Corley R. J. (2003) Atmosphere, Weather and Climate, Routledge, New York.

4. Critchfield H. J. (1987) General Climatology, Prentice-Hall of India, New Delhi

5. Lutgens F. K., Tarbuck E. J. and Tasa D. (2009) The Atmosphere: An Introduction to Meteorolog

6. Oliver J. E. and Hidore J.J. (2002) Climatology: An Atmospheric Science, Pearson

7. Trewartha G. T. and Horne L. H. (1980) An Introduction to Climate, McGraw-Hill.

8. Gupta S.L. (2000): Jalvayu Vigyan, Hindi Madhyam Karyanvay Nidishalya, Delhi Vishwa Vidhyalaya, Delhi

9. Lal, D. S. (2006): Jalvayu Vigyan, Prayag Pustak Bhavan, Allahabad

10. Vatal, M. (1986): Bhautik Bhugol, Central Book Depot, Allahabad

11. Singh, S. (2009): Jalvayu Vigyan, Prayag Pustak Bhawan, Allahabad

12. Malhotra, N. and Sen, S. (2018) Climatology, M K Books, New Delhi

Practical component (if any) - NIL

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – 08 (DSC-08): URBAN GEOGRAPHY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
URBAN GEOGRAPHY	4	3	1	-	12th pass	-

Learning Objectives

- To familiarize student with the nature and scope of urban geography.
- To understand the morphology and hierarchy in urban system.
- To learn about the importance of urban issues in mega- cities.
- To provide knowledge about urban planning and governance.
- To make students learn about the new perspectives of futuristic cities.

Learning outcomes

- Comprehend the fundamentals of urbanization, morphology and hierarchy theories that explain the process of urban development.
- Be conversant with the morphology of Indian cities.
- Be Aware about the issues faced in mega cities.
- Have insight into the master plans, renewal plans, UN-Habitat and urban local bodies
- Explore about the concepts of new urbanism, sustainable, smart and inclusive cities.

SYLLABUS OF DSC-08

Unit-1: Introduction (3hrs)

- Definition of urban; Nature and scope of urban geography; Theories of urban origin (reference Carter).

Unit-II: Urban Morphology and Hierarchy (12hrs)

- Concept and Theories of morphology (Kearsley modified Burgess, Harris & Ullman and White' model; Concept and Theories of Hierarchy-Christaller, and Rank size; Morphology of an Indian City (Madurai or Delhi or Jamshedpur) (ONLY ONE).

Unit-III: Urban Issues in Mega Cities of India (9hrs)

- Urban Basic Services (water in detail with reference to Chennai); Housing and slums (Mumbai).
- Heat island (suitable examples).

Unit-IV: Urban Planning and Governance (9hrs)

- Planning: Concept of Master Plans, AMRUT; Institutions: UN-Habitat, Urban local bodies in India.

Unit-V: Futuristic Cities (12hrs)

- Concept of New Urbanism; Concepts of futuristic cities: sustainable city, smart city, compact city, virtual city, network city, world class city, global city and inclusive city (no question on individual concept); Sustainable city or smart city concept in detail (ONLY ONE).

Suggestive Readings

1. Carter, H. (2010) The Study of Urban Geography, Arnold Publishers, London.
2. Pacione, M. (2009). Urban Geography: A Global Perspective. Taylor and Francis , UK
3. Fyfe, N. R. and Kenny, J. T. (2020). The Urban Geography Reader. London, UK: Routledge.
4. Kaplan, D. H., Wheeler, J. O. and Holloway, S. R. (2008). Urban Geography, John Wiley, New York
5. Ramachandran, R., (1992). Urbanisation and Urban Systems of India. New Delhi, India: Oxford University Press.
6. Singh, S and Saroha, J. (2021) Urban Geography, Pearson Education.
7. मंडल, आर.बी. (2012) नगरिय भुगोल, कॉन्सेप्ट पब्लिशिंग कंपनी, नई दिल्ली।
8. बंसल, एस.सी. (1997) नगरिय भुगोल, मीनाक्षी प्रकाशन, मेरठ।
9. Misra , R.P. (2013) Urbanisation in South Asia, Cambridge University Press, New Delhi
10. Knox, P. L., and McCarthy, L. (2005) Urbanization: An Introduction to Urban Geography, Pearson Prentice Hall, New York
11. Grant, J. (2005) Planning the Good Community: New Urbanism Theory and Practice, Routledge, London
12. Sharma, P. and Rajput, S. (Eds.) (2017). Sustainable Smart Cities in India; Challenges and Future Perspectives, Springer Nature AG, Switzeland
13. Palen, J.J. (2012) The Urban World. Paradigm Publishers, Boulder, USA
14. Graham H. and Colin H. (2003)Sustainable Cities, Routledge, London
15. Singh, R.B., (Ed.) (2015). Urban Development, challenges, risks and Resilience in Asian megacities, Springer

Practical Component (if any): NIL

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi

DISCIPLINE SPECIFIC CORE COURSE – 09 (DSC-09): FUNDAMENTALS OF REMOTE SENSING (PRACTICAL)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course(if any)
		Lecture	Tutorial	Practical/ Practice		
FUNDAMENTALS OF REMOTE SENSING (PRACTICAL)	4	-	-	4	12th Pass	

Note: one credit of practical is equal to two hours

Learning Objectives

The Learning Objectives of this course are as follows:

- To apprise the students with the relevance of Remote Sensing in Geography and the historical growth of Satellites in India and the world.
- To impart the knowledge of fundamentals of remote sensing and its applications.
- To facilitate the students to have hands on experience on different steps of visual interpretation of satellite images & photographs.
- To facilitate the students to have hands on experience on different steps of satellite image processing using one or more software for a geographical application.

Learning outcomes

On completion of this course, the student shall be able:

- To comprehend the concepts related to remote sensing and in understanding their relevance in geography discipline.
- To enhance their ability in describing the basic principles of image processing, visualization and analysis.
- To enrich their ability to conduct basic image processing of satellite multispectral imagery.

SYLLABUS OF DSC-09

UNIT – I: Introduction to Remote Sensing (10hrs)

- Meaning and Definition
- Historical Evolution of Remote Sensing
  - (i) Platforms (Ground, Air, Space)
  - (ii) Types of Remote Sensing (Passive, Active).
  - (iii) Resolution Types (Spatial, Spectral, Radiometric, Temporal)
- Satellite data sources/Search engines: EARTHDATA, USGS, GLCF, LP-DAAC
- Software: QGIS, ARCGIS , ERDAS, IDRISI, TerrSet, ENVI, R, SAGA

UNIT – II: Aerial Photos: Geometry and Types of Aerial Photography, Stereoscope, Annotation, Interpretation Keys, and Interpretation (16hrs)

- Calculation of photo scale
- Orientation of Aerial Photo
- Annotation and Interpretation Keys

UNIT – III: Satellite Remote Sensing (24hrs):

- Principles, Resolutions, EMR Interaction with Atmosphere and Earth Surface Features; Major Satellites and Sensors (LANDSAT, IRS, IKONOS, SPOT, MODIS, Sentinel, QUICKBIRD, any two)
- Downloading Bhuvan Data
- Downloading LANDSAT data (EARTHDATA)
- Band-wise reflection of EMR
- **UNIT–IV: Satellite Image Processing (20hrs):**
- Pre-processing (Radiometric and Geometric Correction); Enhancement (Filtering); Classification Basics (Supervised and Un-supervised), DN to reflectance conversion
- Geometric Correction

UNIT – V Application of Remote Sensing (20hrs):

- Land Use/Land Cover,
- Urban Sprawl,
- Vegetation Monitoring

Suggestive readings

1. Campbell, J. C., and Wynne, R. H. (2022) Introduction to Remote Sensing, 5th ed. The Guilford Press. New York 622p.
2. Jenson, J.R. (2000). Remote Sensing of the environment – An Earth Resource Perspective, Prentice Hall Inc.
3. Jensen, J.R. (2015) Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, Pearson India.
4. Joseph, G. and Jegganathan, C. (2017) Fundamentals of Remote Sensing, 3rd Edition, Universities Press..
5. Leshner, R.B. and Hogan, T. (2019) The View from Space : NASA'S evolving Struggle to understand our Planet, Lawrence, Kansas : University Press of Kansas, 249pp.
6. Lillisand, T. M. and Keifer, R. W. (2011)). Remote Sensing and Image interpretation', 3rd Edition John Willey and Sons, New York.
7. NASA (2018) EOSDIS Handbook, NASA, 52 pp.(https://www.earthdata.nasa.gov/s3fs-public/imported/EOSDIS_Handbook_1.5.pdf)
8. NRSC, ISRO (2015) Bhuvan : User Handbook, NRSC-DPPAWA-GWGSG,NRSC-ISRO, 92 pp.
9. Qihao, W.(2012)An Introduction to Contemporary Remote Sensing, McGraw Hill Pub, ISBN: 9780071740111
10. Sabins, F.F. (2007) Remote Sensing: Principles and Interpretation, 3rd Edition, Waveland Pr, Inc ,ISBN-13-978-1577665076
11. Toro, F.G. and Tsourdos, (2017) UAV OR Drones for Remote Sensing Applications, MDPI, 406 pp,
12. Tempfli, K., Kerle, N., Huurneman, G.C. and Janssen, L.L.F. (Eds) (2009) Principles of Remote Sensing : An Introductory Text Book, ITC: Enschede, The Netherlands.
13. Wegmann M., Leutner, B., Dech, S. (eds) 2016. Remote sensing and GIS for Ecologists. Pelagic Publishing, UK. 331pp.

Category II

Geography Courses for Undergraduate Programme of study with Geography as one of the Core Disciplines

(B.A. Programmes with Geography as Major discipline)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

DISCIPLINE SPECIFIC CORE COURSE – 3 (DSC-07): CLIMATOLOGY

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
CLIMATOLOGY	4	3	1	-	12th Pass	-

Learning Objectives

The Learning Outcomes of this course are as follows:

- Explaining various dimensions of climatology
- Analysing atmospheric moisture along with disturbances
- An understanding world climatic regions

Learning outcomes

The Learning Outcomes of this course are as follows:

- Detailed exposure to climatology.
- In-depth knowledge of atmospheric moisture and cyclonic features.
- Knowledge of the mechanism of monsoon and climatic classification.

SYLLABUS OF DSC-07

Unit-I: Introduction (2hrs):

- Nature, Scope, and Application.

Unit-II: Atmospheric Moisture (12hrs):

- Humidity-types, Evapotranspiration, Condensation- process and forms (a. clouds, and b. fog), Precipitation- forms and types, Atmospheric Stability and Instability.

Unit-III: Atmospheric Disturbances (12hrs):

- Tropical Cyclones- Characteristics, Mechanism and Distribution.
- Temperate Cyclones- Characteristics, Mechanism (Polar Front Theory) and Distribution.

Unit-IV: Monsoon (10hrs):

- Mechanism of monsoon.
- Global teleconnections in relation to monsoon in India, ENSO, Indian Ocean Dipole Effect.
- Jet Streams and Monsoon in India.

Unit-V: Climatic Classification (9hrs):

- Concept and Purpose of Classification.
- Koppen's Classification.

Suggestive Readings

1. Frederick K. Lutgens, Edward J. Tarbuck, Dennis G. Tasa (2015) The Atmosphere: An Introduction to Meteorology, Pearson Education

2. Barry R. G. and Carleton A. M. (2001) Synoptic and Dynamic Climatology, Routledge, UK. 2

3. Barry R. G. and Corley R. J. (2003) Atmosphere, Weather and Climate, Routledge, New York.

4. Critchfield H. J. (1987) General Climatology, Prentice-Hall of India, New Delhi

5. Lutgens F. K., Tarbuck E. J. and Tasa D. (2009) The Atmosphere: An Introduction to Meteorolog

6. Oliver J. E. and Hidore J.J. (2002) Climatology: An Atmospheric Science, Pearson

7. Trewartha G. T. and Horne L. H. (1980) An Introduction to Climate, McGraw-Hill.

8. Gupta S.L. (2000): Jalvayu Vigyan, Hindi MadhyamKaryanvayNidishalya, Delhi Vishwa Vidhyalaya, Delhi

9. Lal, D. S. (2006): Jalvayu Vigyan, PrayagPustak Bhavan, Allahabad

10. Vatal, M. (1986): BhautikBhugol, Central Book Depot, Allahabad

11. Singh, S. (2009): Jalvayu Vigyan, PrayagPustak Bhawan, Allahabad

12. Malhotra, N. and Sen, S. (2018) Climatology, M K Books, New Delhi

Practical component (if any) - NIL

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – 4 (DSC-08): URBAN GEOGRAPHY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
URBAN GEOGRAPHY	4	3	1	-	12th Pass	-

Learning Objectives

- To familiarize student with the nature and scope of urban geography.
- To understand the morphology and hierarchy in urban system.
- To learn about the importance of urban issues in mega- cities.
- To provide knowledge about urban planning and governance.
- To make students learn about the new perspectives of futuristic cities.

Learning outcomes

- Comprehend the fundamentals of urbanization, morphology and hierarchy theories that explain the process of urban development.
- Be conversant with the morphology of Indian cities.
- Be Aware about the issues faced in mega cities.
- Have insight into the master plans, renewal plans, UN-Habitat and urban local bodies
- Explore about the concepts of new urbanism, sustainable, smart and inclusive cities.

SYLLABUS OF DSC-08

Unit-1: Introduction (3hrs):

Definition of urban; Nature and scope of urban geography; Theories of urban origin (reference Carter).

Unit-II: Urban Morphology and Hierarchy (12hrs):

Concept and Theories of morphology (Kearsley modified Burgess, Harris & Ullman and White' model; Concept and Theories of Hierarchy - Christaller and Rank size; Morphology of an Indian City (Madurai or Delhi or Jamshedpur) (ONLY ONE).

Unit-III: Urban Issues in Mega Cities of India (9hrs):

Urban Basic Services (water in detail with reference to Chennai); Housing and slums (Mumbai); Heat island (suitable examples).

Unit-IV: Urban Planning and Governance (9hrs):

Planning: Concept of Master Plans, AMRUT; Institutions: UN-Habitat, Urban local bodies in India.

Unit-V: Futuristic Cities (12hrs):

Concept of New Urbanism; Concepts of futuristic cities: sustainable city, smart city, compact city, virtual city, network city, world class city, global city and inclusive city (no question on individual concept); Sustainable city or smart city concept in detail (ONLY ONE).

Suggestive Readings

1. Carter, H. (2010) The Study of Urban Geography, Arnold Publishers, London.

2. Pacione, M. (2009). Urban Geography: A Global Perspective. Taylor and Francis, UK.

3. Fyfe, N. R. and Kenny, J. T. (2020). The Urban Geography Reader. London, UK: Routledge.

4. Kaplan, D. H., Wheeler, J. O. and Holloway, S. R. (2008). Urban Geography, John Wiley, New York

5. Ramachandran, R., (1992). Urbanisation and Urban Systems of India. New Delhi, India: Oxford University Press.

6. Singh, S and Saroha, J. (2021) Urban Geography, Pearson Education.

7. मंडल, आर.बी. (2012) नगरिय भुगोल, कॉन्सेप्ट पब्लिशिंग कंपनी, नई दिल्ली।

8. बंसल, एस.सी. (1997) नगरिय भुगोल, मीनाक्षी प्रकाशन, मेरठ।

9. Misra, R.P. (2013) Urbanisation in South Asia, Cambridge University Press, New Delhi

10. Knox, P. L., and McCarthy, L. (2005) Urbanization: An Introduction to Urban Geography, Pearson Prentice Hall, New York

11. Grant, J. (2005) Planning the Good Community: New Urbanism Theory and Practice, Routledge, London

12. Sharma, P. and Rajput, S. (Eds.) (2017). Sustainable Smart Cities in India; Challenges and Future Perspectives, Springer Nature AG, Switzeland

13. Palen, J.J. (2012) The Urban World. Paradigm Publishers, Boulder, USA

14. Graham H. and Colin H. (2003) Sustainable Cities, Routledge, London

15. Singh, R.B., (Ed.) (2015). Urban Development, challenges, risks and Resilience in Asian megacities, Springer

Practical Component (if any): NIL

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi

Category III

B.A. Programmes with Geography as non-Major or Minor discipline

DISCIPLINE SPECIFIC CORE COURSE – 5 (DSC-07): CLIMATOLOGY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
CLIMATOLOGY	4	3	1	-	12th Pass	-

Learning Objectives

The Learning Outcomes of this course are as follows:

- Explaining various dimensions of climatology
- Analysing atmospheric moisture along with disturbances
- An understanding world climatic regions

Learning outcomes

The Learning Outcomes of this course are as follows:

1. Detailed exposure to climatology.
2. In-depth knowledge of atmospheric moisture and cyclonic features.
3. Knowledge of the mechanism of monsoon and climatic classification.

SYLLABUS OF DSC-07

Unit-I: Introduction (2hrs):

- Nature, Scope, and Application.

Unit-II: Atmospheric Moisture (12hrs):

- Humidity-types, Evapotranspiration, Condensation- process and forms (a. clouds, and b. fog), Precipitation- forms and types, Atmospheric Stability and Instability.

Unit-III: Atmospheric Disturbances (12hrs):

- Tropical Cyclones- Characteristics, Mechanism and Distribution.
- Temperate Cyclones- Characteristics, Mechanism (Polar Front Theory) and Distribution.

Unit-IV: Monsoon (10hrs):

- Mechanism of monsoon.
- Global teleconnections in relation to monsoon in India, ENSO, Indian Ocean Dipole Effect.

- Jet Streams and Monsoon in India.

Unit-V: Climatic Classification (9hrs):

- Concept and Purpose of Classification.
- Koppen's Classification.

Suggestive Readings

1. Frederick K. Lutgens, Edward J. Tarbuck, Dennis G. Tasa (2015) The Atmosphere: An Introduction to Meteorology, Pearson Education

2. Barry R. G. and Carleton A. M. (2001) Synoptic and Dynamic Climatology, Routledge, UK. 2

3. Barry R. G. and Corley R. J. (2003) Atmosphere, Weather and Climate, Routledge, New York.

4. Critchfield H. J. (1987) General Climatology, Prentice-Hall of India, New Delhi

5. Lutgens F. K., Tarbuck E. J. and Tasa D. (2009) The Atmosphere: An Introduction to Meteorolog

6. Oliver J. E. and Hidore J.J. (2002) Climatology: An Atmospheric Science, Pearson

7. Trewartha G. T. and Horne L. H. (1980) An Introduction to Climate, McGraw-Hill.

8. Gupta S.L. (2000): Jalvayu Vigyan, Hindi Madhyam Karyanvay Nidishalya, Delhi Vishwa Vidhyalaya, Delhi

9. Lal, D. S. (2006): Jalvayu Vigyan, Prayag Pustak Bhavan, Allahabad

10. Vatal, M. (1986): Bhautik Bhugol, Central Book Depot, Allahabad

11. Singh, S. (2009): Jalvayu Vigyan, Prayag Pustak Bhawan, Allahabad

12. Malhotra, N. and Sen, S. (2018) Climatology, M K Books, New Delhi

Practical component (if any) - NIL

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

COMMON POOL OF DISCIPLINE SPECIFIC ELECTIVE (DSE) COURSES OFFERED BY THE DEPARTMENT OF GEOGRAPHY

DISCIPLINE SPECIFIC ELECTIVE COURSE – 01 (DSE-01): BIOGEOGRAPHY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
BIOGEOGRAPHY	4	3	1	-	12th Pass	-	GEOGRAPHY

Course Objectives:

- To understand various dimensions of biogeography.
- To get detailed analysis of energy cycles and their function.
- To understand the concept of ecological succession and various biogeographical processes.
- To identify geographical distribution of flora and flora of the world.
- To realize and understand the conservation of biodiversity.

Learning Outcome:

- Detailed exposure of biogeography and biodiversity.
- In-depth knowledge of circulation of biogeochemical cycles.
- Functionality of the biogeographical processes.
- Knowledge of Phytogeographical realms and Zoogeographical realms.
- Develop understanding of the global level efforts to conserve biodiversity.
-

SYLLABUS OF DSE-01

Unit-I: Introduction (2hrs):

- Nature, Approaches, significance and Scope.

Unit-II: Biogeographical Processes (12hrs):

- Dispersal, Speciation, Ecological Succession, Extinction.

Unit-III: Biogeochemical Cycles (12hrs):

- Oxygen, Carbon and Nitrogen.

Unit-IV: Geographical Distribution of flora and fauna (12hrs):

- Phytogeographical realms, Zoogeographical realms (with specific reference to Wallace and Weber line)- Basis and Classification.

Unit-V: Conservation (7hrs):

- In situ and ex situ, CBD (Convention on Biodiversity).

Suggestive Readings:

1. Bhattacharyya, N.N. (2003). Biogeography. New Delhi, India: Rajesh Publications.
2. Huggett, R.J. (1998). Fundamentals of Biogeography, USA: Routeldge
3. Lomolino, Mark. V., 2020, Biogeography: A Very Short Introduction, Oxford Publication, ISBN: 9780198850069
4. Cox, C.B, et.al, 2016, Biogeography: An Ecological and Evolutionary Approach, 9th Edition, Wiley-Blackwell.
5. Taylor, J.A., 2021, Themes in Biogeography, Routledge, Taylor and Francis publications, ISBN 9780367351106
6. Pielou, E.C., 1979, Biogeography, John Wiley & Sons, USA.
10: 0471058459ISBN 13: 9780471058458
7. L.C Aggarwal, 2018, Biogeography, Rawat publication Jaipur
8. Mathur, H.S. (1998). Essentials of Biogeography. Jaipur, India: Anuj Printers.
9. Singh,Savindra. (2015). Jaiv Bhoogol (Hindi). Allahabad, India: Prayag Pushtak Bhawan
10. Sivaperuman, Chandrakasan et al. (2018). Biodiversity and Climate Change Adaptation in Tropical Islands. London, UK: Academic Press.

DISCIPLINE SPECIFIC ELECTIVES (DSE-02): GEOGRAPHY OF ARID AND SEMI-ARID REGION

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
GEOGRAPHY OF ARID AND SEMI-ARID REGION	4	3	1	-	12th Pass	-	GEOGRAPHY

Course Objectives:

- To evolve the understanding of the regional dimensions of arid and semi-arid regions.
- To correlate the physical dimensions with human perspectives as population size and occupation of arid regions.
- To understand the challenges of aridity in global perspective and measures of sustainability.

Learning Outcome:

- Developing the skill to differentiate the geographical uniquities on space.
- Comprehend the regional knowledge of arid regions for the application of social welfare.
- Analysis and evaluation of regional geographical parameters of aridity related to its challenges and livelihood security.

SYLLABUS OF DSE-02

Unit-I: Introduction (5hrs):

- Extent, Characteristics and Determinants of arid and semi-arid regions of the world

Unit-II: Climate and Vegetation (10hrs):

- Types and characteristics.

Unit-III: Human Aspects (10hrs):

- Population distribution and major tribes.

Unit-IV: Economic Aspects (10hrs):

- Agriculture, Livestock rearing and tertiary activities.

Unit-V: Challenges and sustainability (10hrs):

- Desertification, land degradation, biodiversity loss and practices of livelihood security.

Suggestive Readings:

1. Hill, Michael, 2002, Arid and Semi-Arid Environments, Hodder Murray, London.
2. Campos-Lopez, Enrique and Anderson, Robert J. (eds), 2018, Natural Resources and Development in Arid Regions, Routledge, Newyork.
3. Goudie, Andrew, S., 2013, Arid and Semi-Arid Geomorphology, Cambridge University Press.
4. Ferguson, Gabriel, 2015, Arid and Semi-Arid Environments, NOVA.
5. Whitford, W.G. and Duval, B.D., 2019, Ecology of Desert Systems, Elsevier.
6. Laity. J., 2018, Deserts and Desert Environments, Wiley Blackwell.
7. Sharma, R.C., 1998, Thar: The Great Indian Deserts, Roli Books.
8. Warner, T., 2004, Desert Meteorology, Cambridge University Press.
9. Bhandari, M.M. and Vyas, S.P. 2019, Flora of The Indian Desert: Their Economic And Medicinal Value, Scientific Publishers.
10. Walton, Kenneth, 2009, The Arid Zones, Aldine Transactions, New Brunswick (UDA), London (UK).
11. Gritzner, Charles F., 2007, Geography of Extreme Environments: Deserts, Chelsea House, Newyork.
12. Aleshire, Peter, 2008, The Extreme Earth: Deserts, Chelsea House, Newyork.

GENERIC ELECTIVES (GE-07): CONTEMPORARY ENVIRONMENTAL ISSUES

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
CONTEMPORARY ENVIRONMENTAL ISSUES	4	3	1	-	12th Pass	-	GEOGRAPHY

Learning Objectives

- To understand the basic concepts of human environment and the resultant impact.
- To evaluate the contemporary environmental issues world over.
- To assess each problem in detail along with a case study of the best practices in the world.
- To discuss the global level initiatives or policies related to these issues.

Learning Outcomes

- The changes that have taken place due to the human impact on nature.
- Recognize the concept of planetary boundaries and how humanity has already crossed the tipping point.
- Have an understanding of both the problems and some specific solutions.
- An in-depth understanding on the global policies and where the world stands today.
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SYLLABUS OF GE-07

Unit-I: Introduction (5hrs):

- Understanding the human environment relationship and its historical progression, concept of planetary boundaries.

Unit-II: Biodiversity Loss (10hrs):

- Causes and impacts, Conservation and Global initiatives, Case study on best practices.

Unit-III: Pollution (12hrs):

- Air and Water (causes and impacts), Solid Waste (impact and management), Global initiatives, case Study on best practices.

Unit-IV: Land Degradation (10hrs):

- Causes and impacts, Global initiatives, Case Study on best practices.

Unit-V: Climate Change (8hrs):

- Concept, Adaptation and Mitigation.

Suggested Readings

1. Brusseau M L, Pepper I L and Gerba C P (2019) Environmental and Pollution Science, Academic Press, USA.
2. Cunninghum, WP and Cunninghum, M A (2004) *Principals of Environmental Science: Inquiry and Applications*, Delhi: Tata Macgraw Hill.
3. Goudie A (2001) *The Nature of the Environment*, Blackwell, Oxford, UK: Blackwell.
4. Haris F (Ed) (2004) *Global Environmental Issues*, John Wiley and Sons, W Sussex.
5. Kemp D D(1994)*Global Environmental Issues: A Climatological Approach*, Routledge London and NY.
6. Pickering K T and Owen L A (2017)*An Introduction to Global Environmental Issues,* Routledge London (eBook).
7. Raven P H, Berg L R, Hassenzehl D M et al. (2015) *Environment*, John Wiley and Sons, Jefferson City.
8. Rich Nathalien(2020) *Losing Earth: A Recent History*, Picador, New York.
9. Rockstrom J and Gaffney O (2021) *Breaking Boundaries: The Science of Our Planet*, Penguin Random House LLC.
10. Sivaperuman, Chandrakasan. et al. (2018) *Biodiversity and Climate Change Adaptation in Tropical Islands,* London, UK: Academic Press.
11. Tsing A Lowenhaupt et al. (Ed) (2017) Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene, University of Minnesota Press, Minneapolis.
12. Wright RT and Boorse DF (2010) Towards a Sustainable Future, PHI Learning Pvt Ltd, New Delhi.

GENERIC ELECTIVES (GE-08): GEOGRAPHY OF TOURISM

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
GEOGRPHY OF TOURISM	4	3	1	-	12th Pass	-	GEOGRAPHY

Course Objectives

- To be aware of the various dimensions of Geography of Tourism.
- To make the students aware about the growth and development of international and domestic tourism with its positive and negative impacts.
- To assess sustainable ecotourism and other contemporary forms of tourism with help of case study.
- To critically evaluate the infrastructure in tourism in India along with reviewing the tourism policy.

Learning Outcome:

- Equip with a basic understanding of nature and scope of geography of tourism and various types of tourists and tourism.
- Have sound knowledge of geographical, environmental, and socio-cultural aspects of tourism.
- Apply the principles of sustainable tourism and analyse the prospects and problems associated with unsustainable tourism activities

SYLLABUS OF GE-08

Unit-I: Introduction (5hrs):

- Nature and Scope; Tourism, Recreation and Leisure;
- Types of Tourism and Types of Tourists

Unit-II: Factors affecting Tourism (10hrs):

- Growth and Development of International and Domestic Tourism.

Unit-III: Significance of Tourism (10hrs):

- Impact on Environment, Economy, Society and Culture.

Unit-IV: Contemporary Forms of Tourism (12hrs):

- Sustainable - Ecotourism (Case Study), Geo-Heritage (Case Study), Space tourism, E-Tourism, MICE.

Unit-V: Tourism Infrastructure (8hrs):

- Infrastructure Development in India, National Tourism Policy of India.

Suggested Readings

1. Brian Boniface, Chris Cooper, Robyn Cooper., Worldwide Destinations: The Geography of Travel and Tourism (8th edition, 2020).

2. Douglas G. Pearce., Tourist Development (Topics in applied geography). 19813rd Edition.

3. Stephen Williams, Alan A. Lew., Tourism Geography- Critical Understandings of Place, Space and Experience.

4. Velvet Nelson., An Introduction to the Geography of Tourism, 3rd edition, 2021.

5. Maria Giaoutzi., Tourism and Regional Development - New pathways (economic geography series) 2017. Routledge.

5. Stephen Hall, C. Michael and J.Page., The Geography of Tourism and Recreation: Environment, Place and Space. 4th edition, 2014. Routledge.

6. Chaturbhuj Mamoria and Komal Singh. पर्यटन का भूगोल (Geography of Tourism)

7. पर्यटन भूगोल: प्रा.के.ए. खतीब, मेहता पब्लिशिंग हाऊस

8. Kapoor, B.K. (2008) Paryatan Bhugol, Vishwa Bharti Publication, Delhi.

9. E Book of India Tourism Statistics, 2022. Ministry of Tourism, Govt. of India.

10. UNWTO, 2022. Tourism Data Dashboard.

GENERIC ELECTIVES (GE-09): SPATIAL INFORMATION TECHNOLOGY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
SPATIAL INFORMATION TECHNOLOGY	4	3	1	-	12th Pass	-	GEOGRAPHY

Course Objectives:

1. The main objective of this course is to give students an insight on the concepts of spatial information technology.
2. The paper discusses the concept, historical developments, functioning and application of spatial information technology in detail.

Learning Outcome:

1. Will be familiar with the concept, components of SIT.
2. Will gained knowledge on various data sources, structures, and their interpolation and modeling.
3. Will acquire in-depth knowledge of various functions applied in SIT.
4. Will gather detailed information on the application of SIT in various fields of mapping.

SYLLABUS OF GE-09

Unit-I: Introduction (5hrs):

- Definitions, Concept, Components and Historical Development.

Unit-II: Spatial Information/Data (10hrs):

- Web data sources; Registration and projection; Data types structures; Data interpolation and modelling.

Unit-III: Working on Spatial Information System (12hrs):

- Data creation with GIS software, making layers, data editing and cleaning, spatial and non-spatial data linking, extracting information.

Unit-IV: Functions of Spatial Information System (12hrs):

- Overlay Analysis; Buffer Analysis, Network Analysis.

Unit-V: Application (6hrs):

- Application of Spatial Information Technology for sustainable development.

Suggested Readings

1. D. Tomlin. (1990). *Geographic Information Systems and Cartographic Modeling*.USA: Prentice-Hall, Englewood Cliffs, NJ, ISBN0-13-350927-3.
2. Esperança and Samet, H. (1997). *An overview of the spatial data base system, to appear in Communications of the ACM.* (http://www.cs.umd.edu/~hjs/pubs/sandprog.ps.gz)
3. Heywood, I., Comelius, S., and Carver, S. (1988). *An Introduction to Geographical Information Systems*. NewYork , USA: Addison Wiley Longmont.
4. Samet, H. (1990). *Applications of Spatial Data Structures: Computer Graphics, Image Processing, and GIS*. USA: Addison-Wesley, Reading, MA, ISBN 0-201- 50300-0.
5. Samet, H. (1990). *The Design and Analysis of Spatial Data Structures*. USA: Addison-Wesley, Reading, MA, ISBN0-201-50255-0.
6. Samet, H. (1995). *Spatial Data Structures in Modern Database Systems: The Object Model, Interoperability, and Beyond*, W. Kim, (Ed.,) USA: Addison-Wesley/ACM Press, 361.
7. http://www.cs.umd.edu/~hjs/pubs/kim.ps
8. http://www.cs.umd.edu/~hjs/pubs/kim2.ps