

M.A./M.Sc. (Two Years Degree Program)	
First Semester	
Subject-Geography	
Code of the Course	GEG8003T
Title of the Course	CLIMATOLOGY AND OCEANOGRAPHY
Qualification Level of the Course	NHEQF Level 6.5
Credit of the course	4
Type of the course	Discipline Centric Core Course in Geography
Delivery type of the Course	Lecture (40+20 = 60). The 40 hours for content delivery and 20 hours of diagnostic assessment, formative assessment, and subject/ class activity, problem solving.
Prerequisites	Understanding of the basic concepts of Climatology & Oceanography of Graduation level. Basic Science of secondary level.
Co-requisites	None
Objectives of the course	<ul style="list-style-type: none"> • To give a comprehensive & integrated knowledge and understanding of composition and layered structure of the atmosphere, insolation and atmospheric pressure. • To give a comprehensive & integrated knowledge and understanding about winds, atmospheric humidity, air masses and cyclones. • To give an understanding of Koppen's and Thornthwaite's classifications of climate and Major climates of the world. • To give a comprehensive & integrated knowledge and understanding about oceanography, ocean bottom relief, ocean temperature and salinity, Coral reefs, Tides, ocean currents, marine resources, blue economy and sea level changes. • The course would help students to contextualize much of their further learnings, teaching and research within the contents of

	this course.
Learning outcomes	<ul style="list-style-type: none"> • Knowledge and understanding of composition and layered structure of the atmosphere, insolation and atmospheric pressure. • Knowledge and understanding of winds, atmospheric humidity, air masses and cyclones. • Knowledge and understanding of Koppen's and Thornthwaite's classifications of climate and Major climates of the world. • Knowledge and understanding of oceanography, ocean bottom relief, ocean temperature and salinity, Coral reefs, Tides ocean currents, marine resources, blue economy and sea level changes.
Syllabus पाठ्यक्रम	
UNIT - I	<p>Nature and scope of Climatology. Composition and layered structure of the atmosphere. Insolation; energy balance of the Earth; horizontal and vertical distribution of temperature. Atmospheric pressure and pressure belts.</p> <p>जलवायु विज्ञान की प्रकृति एवं विषय वस्तु। वायुमंडल का संघटन एवं परतों की संरचना। सूर्याभिताप; पृथ्वी का ऊर्जा बजट; तापमान का ऊर्ध्वाधर एवं क्षैतिज वितरण। वायुमंडलीय दाब एवं वायुदाब की पेटियां।</p>
UNIT - II	<p>Winds: forces-PGF, CF, FF. Planetary, periodic and local winds; jet streams. Atmospheric humidity—process and forms of precipitation: types of rainfall; world distribution of rainfall. El Nino- La Nina; Walker's circulation & El Nino Southern Oscillation (ENSO). Air masses and fronts; tropical and temperate cyclones.</p> <p>पवनें: बल—दबाव प्रवणक, कोरियोलिस, घर्षण। स्थायी, सामयिक एवं स्थानीय पवने; जेट स्ट्रीम। वायुमंडलीय आर्द्रता—वर्षण की प्रक्रिया एवं प्रकार: वर्षा के प्रकार; वर्षा का विश्व वितरण। एल निनो एवं ला निनो; वॉकर परिसंचरण एवं एल निनो दक्षिणी दोलन। वायु राशिया एवं वाताग्र; उष्ण एवं शीतोष्ण चक्रवात।</p>
UNIT - III	<p>Approaches to classification of world climates; Koppen's and Thornthwaite's classifications. Major climates of the world: Characteristics of Equatorial, Tropical Monsoon, Savanna, Hot Desert, Mediterranean and Mountain type of climate.</p>

	<p>विश्व जलवायु वर्गीकरण की योजनाएं; कोपेन एवं थॉर्नथ्वेट का वर्गीकरण। विश्व की प्रमुख जलवायुएं: भूमध्यरेखीय, उष्ण कटिबंधीय मानसून, सवाना, उष्ण मरुस्थल, भूमध्यसागरीय एवं पर्वतीय जलवायु प्रकारों की विशेषताएं।</p>
UNIT - IV	<p>Nature and scope of Oceanography. Ocean bottom relief; relief of Indian and Atlantic oceans. Ocean temperature and salinity: factors and distribution patterns. Coral reefs: types and theories of formation; Darwin, Daly and Murray.</p> <p>समुद्रविज्ञान की प्रकृति एवं विषय वस्तु। महासागरीय नितल के उच्चावच; हिंद एवं अटलांटिक महासागर के नितल उच्चावच। महासागरीय तापमान एवं लवणता: कारक और वितरण प्रतिरूप। प्रवाल भित्ति: प्रकार एवं उत्पत्ति के सिद्धांत; डार्विन, डैली एवं मरे।</p>
UNIT - V	<p>Tides: types, theories of origin of tides: Newton, Whewell & Harris. Ocean currents: currents of Indian, Atlantic and Pacific Ocean. Marine resources: food, mineral and energy resources. Concept of blue economy. Sea level changes; impact of human activities on marine communities.</p> <p>ज्वार: प्रकार, ज्वार उत्पत्ति के सिद्धांत: न्यूटन, ह्यूवेल एवं हैरिस। महासागरीय धाराएं: हिंद, अटलांटिक एवं प्रशांत महासागर की धाराएं। महासागरीय संसाधन: खाद्य पदार्थ, खनिज एवं ऊर्जा संसाधन। नीली अर्थव्यवस्था की संकल्पना। समुद्री तल में परिवर्तन; महासागरीय समुदाय पर मानवीय गतिविधियों का प्रभाव।</p>
	<p>Suggested Readings सहायक ग्रन्थ / सामग्री</p>
Text Books	<ul style="list-style-type: none"> • Singh, Savindra, Climatology and Oceanography, Pravalika Publication, Prayagraj • Lal, D.S., Climatology and Oceanography, Sharda Pustak Bhavan, Prayagraj • Miller, A.A., Climatology, Shubhi Publications, Gurugram • सिंह, सविन्द्र, भौतिक भूगोल, वसुन्धरा प्रकाशन गोरखपुर • सिंह, सविन्द्र, समुद्र विज्ञान, प्रवालिका पब्लिकेशन्स, इलाहाबाद • सिंह, सविन्द्र, जलवायु विज्ञान, प्रवालिका पब्लिकेशन्स, इलाहाबाद • शर्मा, एच.एस., शर्मा, एन. एल., मिश्रा, आर.एन. भौतिक भूगोल, पंचशील प्रकाशन, जयपुर • हुसैन, माजिद, भौतिक भूगोल, रावत पब्लिकेशन्स, नई दिल्ली • बंसल, डॉ. सुरेश चन्द्र, चौहान, डॉ. पंकज कुमार, भौतिक भूगोल, मीनाक्षी प्रकाशन, मेरठ

	<ul style="list-style-type: none"> • लाल, डी. एस., जलवायु एवं समुद्र विज्ञान, शारदा पुस्तक भवन, इलाहाबाद
Reference Books	<ul style="list-style-type: none"> • Barry, R.G. and R.J. Chorley, Atmosphere, Weather and Climate, Routledge, 1998. • Critchfield, H., General Climatology, Pearson Education, India. • Garrison, T., Oceanography, Wadsworth Co., USA, 1998. • Mather, J.R., Climatology, McGraw Hill, New York, 1974. • Monkhouse, F.J., Principles of Physical Geography, Hodder and Stoughton, London, 1960. • Strahler, A.N. and A.H. Strahler, Modern Physical Geography, John Wiley & Sons, 1992. • Trewartha, G.T., An Introduction to Climate, International Students Edition, McGraw Hill, New York, 1980
Suggested E-resources	<ul style="list-style-type: none"> • https://ncert.nic.in/textbook.php?kegy2=0-14 • https://pressbooks.umn.edu/environmentalbiology/chapter/composition-and-structure-of-the-atmosphere/ • https://www.e-education.psu.edu/earth103/node/1004 • https://scijinks.gov/jet-stream/ • https://www.noaa.gov/jetstream/global/jet-stream • https://education.nationalgeographic.org/resource/types-precipitation/ • https://www.dspmuranchi.ac.in/pdf/Blog/tropicalcyclonesandtemperatecyclones-190731075058.pdf • https://www.dspmuranchi.ac.in/pdf/Blog/CLIMATIC%20CLASSIFICATION%20OF%20KOPPEN.pdf • https://gacbe.ac.in/pdf/ematerial/18BGE33C-U2.pdf • https://svs.gsfc.nasa.gov/3652 • https://www.unep.org/interactives/status-world-coral-reefs • https://www.oceano.org/en/thematic-pages/the-coral • https://earth.usc.edu/~stott/Catalina/Oceans.html