List of New Course(s) Introduced

Department : Forestry, Wildlife and Environmental Sciences

Programme Name : B Sc (Forestry)

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
1.	UFOBMJT1/ UFOBMJP1	Fundamentals of Soil Science
2.	UFODMJT2/ UFODMJP2	Forest Management
3.	UFOEMJT1/ UFOEMJP1	Application of RS & GIS in Natural Resource Management
4.	UFOFMJT1/ UFOFMJP1	Forest Pathology and Entomology
5.	UFOHMJT1/ UFOHMJP1	Biostatistics and Research Methodology
6.	UFOGMOC1	Wildlife and its conservation /MOOC

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2024-25

School : Natural Resources

Department : Forestry, Wildlife and Environmental Sciences

Date and Time : July 19, 2025 11:00 am

Venue : HOD room

The scheduled meeting of member of Board of Studies (BoS) of Department Forestry, Wildlife and Environmental Sciences, School of Studies of Natural Resources, Guru Ghasidas Vishwavidyalaya, Bilaspur was held on dated 19.06.2025 at 11:00 am in HOD room to design and discuss the and design the syllabus of B. Sc. (Forestry) 4 Years (8 semester) scheme as per NEP 2020 guidelines, M.Sc. Forestry and Environmental Sciences curriculum and credit framework/ syllabus as per CBCS guidelines. External Expert has joined the meeting through online mode.

The following members were present in the meeting:

1. Prof. Sanjeev Kumar, External Expert Member, Dean, College of Forestry, Banda University Agricultural and Techology, Banda (UP)
2. Shri Pankaj Sharma, External expert, DGM, Environment Management, NTPC, Sipat, Bilaspur
3. Prof. Dr. S.C. Tiwari, Dean, HoD, Chairperson, BoS, Dept. Forestry, Wildlife and Environmental Sciences
4. Prof. S. S. Dhuria, Member of BOS, Dept. Forestry, Wildlife and Environmental Sciences,
5. Prof. K. K. Chandra, Member of BOS, Dept. Forestry, Wildlife and Environmental Sciences,
6. Dr. Ajay Kumar Singh, Member, BoS, Assistant Professor, Dept. Forestry, Wildlife and Environmental Sciences

Following points were discussed during the meeting

- Revised ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program.
- The BoS has approved the NEP2020 Course curriculum and ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program with effect from academic session 2024-25.
- The BoS has approved the NEP2020 Course curriculum and CBCS ordinance of M. Sc. (Forestry) Two Years (4 Semester) degree program with effect from academic session 2025-26.

Following points were discussed during the meeting:

1. New curriculum and credit framework- NEP 2020 for B.Sc. Forestry Four Years (8 Semester) degree program was prepared. The details of course and credits are as follows:

List of new Courses

Sr. No.	Course Code	Name of the Course
1.	UFOBMJT1/ UFOBMJP1	Fundamentals of Soil Science
2.	UFODMJT2/ UFODMJP2	Forest Management
3.	UFOEMJT1/ UFOEMJP1	Application of RS & GIS in Natural Resource Management
4.	UFOFMJT1/ UFOFMJP1	Forest Pathology and Entomology
5.	UFOHMJT1/ UFOHMJP1	Biostatistics and Research Methodology
6.	UFOGMOC1	Wildlife and its Conservation/ MOOC

विभागाध्यक्ष
Head
वानिकी, वन्यजीव एवं पर्यावरण विभाग
Department of Forestry, Wildlife and Environmental Science
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD

Curriculum and Credit Framework- NEP 2020

FOR

B.Sc. FORESTRY

(w.e.f. Academic session:2025-26)

"SCHOOL OF STUDIES OF NATURAL RESOURCES"

DEPARTMENT OF FORESTRY, WILDLIFE & ENVIRONMENTAL SCIENCES

GURU GHASIDAS VISHWAVIDYALAYA

(A Central University established by the Central University Act.2009 No. 25 of 2009)

BILASPUR-495009, CHHATTISGARH

19/06/2025

19/06/2025

B.Sc. Forestry
(4 Year Course)

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
I	Major-01	UFOAMJT1	Silviculture	3	3	100
	Major-01 Practical	UFOAMJP1	Silviculture	1	2	100
	Minor-01		Drawn From the University pool	3	3	100
	Minor-01 Practical			1	2	100
	Multidisciplinary-01		Drawn From the University pool	3	3	100
	Ability Enhancement Course (AEC-01)		Drawn from the University Pool	2	2	100
	Skill Enhancement Course (SEC-01)		Drawn From the University pool	3	3	100
	Value added course-01		Drawn From the University pool	2	2	100
	Value added course-02		Drawn From the University pool	2	2	100
	TOTAL			**20**	**22**	**900**
II	Major -02	UFOBMJT1	Fundamentals of Soil Science	3	3	100
	Major -02 Practical	UFOBMJP1	Fundamentals of Soil Science	1	2	100
	VOC -01		Drawn From the University pool	1	1	100
	VOC -01 Practical			3	6	100
	Multidisciplinary-02		Drawn From the University pool	3	3	100
	Ability Enhancement Compulsory (AEC-02)		Drawn from the university pool	2	2	100

	Skill Enhancement Course (SEC-02)		Drawn From the University pool	3	3	100
	Value added course-03		Drawn From the University pool	2	2	100
	Value added course-04		Drawn From the University pool	2	2	100
	TOTAL			**20**	**24**	**900**
	Summer Internship for two weeks (Compulsory for 1 Year Certificate course)			4		100

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
III	Major -03	UFOCMJT1	Forest Mensuration	3	3	100
	Major -03 Practical	UFOCMJP1	Forest Mensuration	1	2	100
	Major -04	UFOCMJT2	Forest Genetics and Tree Improvement	3	3	100
	Major -04 Practical	UFOCMJP2	Forest Genetics and Tree Improvement	1	2	100
	VOC -02		Drawn From the University pool	1	1	100
	VOC -02 Practical			3	6	100
	Multidisciplinary-03		Drawn From the University pool	3	3	100
	Ability Enhancement Course (AEC- 03)		Drawn From the University Pool	2	2	100
	Skill Enhancement Course (SEC-03)		Drawn From the University Pool	3	3	100
	Total			**20**	**25**	**900**
IV	Major -05	UFODMJT1	Tree Seed and Nursery Technology	4	4	100
	Major -05 Practical	UFODMJP1	Tree Seed and Nursery Technology	1	2	100

	Major -06	UFODMJT2	Forest Management	4	4	100
	Major -06 Practical	UFODMJP2	Forest Management	1	2	100
	Major -07	UFODMJT3	Forest Ecology and Ecosystem Analysis	3	3	100
	Major -07 Practical	UFODMJP3	Forest Ecology and Ecosystem Analysis	1	2	100
	VOC -03		Drawn From the University Pool	1	1	100
	VOC -03 Practical			3	6	100
	Ability Enhancement Course (AEC- 04)		Drawn From the University Pool	2	2	100
	Total			**20**	**26**	**900**
	Summer Internship (Compulsory for 2 Year Diploma course)			4		100
V	Major -08	UFOEMJT1	Application of RS & GIS in Natural Resource Management	4	4	100
	Major -08 Practical	UFOEMJP1	Application of RS & GIS in Natural Resource Management	1	2	100
	Major -09	UFOEMJT2	Wood Science and Technology	4	4	100
	Major -09 Practical	UFOEMJP2	Wood Science and Technology	1	2	100
	Major -10	UFOEMJT3	Forest Resource Economics & Management	4	4	100
	Major -10 Practical	UFOEMJP3	Forest Resource Economics & Management	1	2	100
	Minor- 02		Drawn From the University pool	3	3	100
	Minor - 02 Practical			1	2	100
	Winter Internship	UFOEINT1	Compulsory for the two weeks	2	-	100
	Total			**21**	**23+**	**900**
VI	Major -11	UFOFMJT1	Forest Pathology and Entomology	4	4	100
	Major -11	UFOFMJP1	Forest Pathology and	1	2	100

	Practical		Entomology			
	Major -12	UFOEMJT2	Agroforestry Management	4	4	100
	Major -12 Practical	UFOFMJP2	Agroforestry Management	1	2	100
	Major -13	UFOFMJT3	Forest Products and utilization	4	4	100
	Major -13 Practical	UFOFMJP3	Forest Products and utilization	1	2	100
	Minor- 03		Drawn From the University pool	3	3	100
	Minor- 03 Practical			1	2	100
	TOTAL			**19**	**23**	**800**
VII	Major -14	UFOGMJT1	World Forestry and Community Development	4	4	100
	Major -14 Practical	UFOGMJP1	World Forestry and Community Development	1	2	100
	Major -15	UFOGMJT2	Forest Policies, Acts and Legislation	4	4	100
	Major -15 Practical	UFOGMJP2	Forest Policies, Acts and Legislation	1	2	100
	MOOC -1	UFOGMOC1	Wildlife and its conservation /MOOC	4	4	100
	Minor- 04		Drawn From the University pool	3	3	100
	Minor- 04 Practical			1	2	100
	Seminar	UFOGSMNR	**Seminar (Compulsory)**	1	4	
	TOTAL			**19**	**25**	**700**
VIII (4 Year Honou	Major -16	UFOHMJT1	Biostatistics and Research Methodology	4	4	100
	Major -16 Practical	UFOHMJP1	Biostatistics and Research Methodology	1	2	100

rs course)	Major -17	UFOHMJT2	Forest based Entrepreneurship Development	4	4	100
	Major -17 Practical	UFOHMJP2	Forest based Entrepreneurship Development	1	2	100
	Minor- 05		Drawn From the University pool	3	3	100
	Minor- 05 Practical			1	2	100
	Minor- 06		Drawn From the University pool	3	3	100
	Minor- 06 Practical			1	2	100
	Seminar		Seminar	3	3	100
			Total	**21**		**900**
VIII (4 Year Honours with Research)	Major -16	UFOHMJT1	Biostatistics and Research Methodology	4	4	100
	Major -16 Practical	UFOHMJP1	Biostatistics and Research Methodology	1	2	100
	Minor- 05		Drawn From the University pool	3	3	100
	Minor- 05 Practical			1	2	100
	Research Project/Dissertation	UFOHRPDSSS1	Research Project/Dissertation	12	-	100
			Total	**21**		**500**
GRAND TOTAL CREDITS				**160**		

Minor Courses offered by Department of Forestry Wildlife and Environmental Sciences

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
I	MINOR-1	UFOAMNT1	Introduction to Wildlife	3	5	100
	MINOR-1 (Practical)	UFOAMNP1	Introduction to Wildlife	1		100
V	MINOR-2	UFOEMNT1	Earth Care Policy	3	5	100
	MINOR-2 (Practical)	UFOEMNP1	Earth Care Policy	1		100
VI	MINOR-3	UFOFMNT1	Commercial Nursery Production	3	5	100
	MINOR-3 (Practical)	UFOFMNP1	Commercial Nursery Production	1		100
VII	MINOR-4	UFOGMNT1	Value addition of NTFP	3	5	100
	MINOR-4 (Practical)	UFOGMNP1	Value addition of NTFP	1		100
VIII	MINOR-	UFOHMNT1	Urban Forestry	3	5	100

	5		and Designing			
	MINOR-5 (Practical)	UFOHMNP1	Urban Forestry and Designing	1		100
	MINOR-6	UFOHMNT2	Ecotourism	3	5	100
	MINOR-6 (Practical)	UFOHMNP2	Ecotourism	1		100

Vocational Courses offered by Department of Forestry Wildlife and Environmental Sciences

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
II	VOC -1	UFOBVCT1	Nursery and Plantation Technology	1	1	100
	V O C - 1 (Practical)	UFOBVCP1	Nursery and Plantation Technology	3	6	100
III	VOC – 2	UFOCVCT1	Environmental audit	1	1	100
	V O C - 2 (Practical)	UFOCVCP1	Environmental audit	3	6	100
IV	VOC-3	UFODVCT1	Industrial Plantation	1	1	100
	V O C - 3 (Practical)	UFODVCP1	Industrial Plantation	3	6	100

Multidisciplinary Courses offered by Department of Forestry Wildlife and Environmental Sciences

Semester	Course	Course Code	Name of the course	Credit	Hour/week	Marks
I	MULT-01	UFOAMDT1	Know Your Forest	3	3	100
II	MULT-02	UFOBMDT1	Introduction to Indian wildlife	3	3	100
III	MULT-03	UFOCMDT1	Plantation Forestry	3	3	100

Skill Enhancement Courses offered by Department of Forestry Wildlife and Environmental Sciences

Sl. No.	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
I	SEC-01	UFOASCT1	Nursery Technology	2	4	100
	SEC-01 (Practical)	UFOASCP1	Nursery Technology	1		100
II	SEC-02	UFOBSCT1	Wildlife Biology	2	4	100
	SEC-02 (Practical)	UFOBSCP1	Wildlife Biology	1		100
III	SEC-03	UFOCSCT1	Afforestation Techniques	2	4	100
	SEC-03 (Practical)	UFOCSCP1	Afforestation Techniques	1		100

Value Added Courses offered by Department of Forestry Wildlife and Environmental Sciences

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
I/II	VAC-01	UFOVACT1	Environmental Education	2	2	100
As per university instruction environmental education subject will be taught to the different student of the university.						

MOOC Course offered by the different online platform.

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
VII	MOOC	UFOGMOC1	Wildlife and its Conservation /MOOC	4	4	100
As per university instruction online/offline MOOC subject will be taught to the student if not available on online platform.						

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PAPER-VI: VALUE ADDED COURSE (VAC-01) CR: 2
Drawn from the University pool

PAPER-VII: VALUE ADDED COURSE (VAC-02) CR: 2
Drawn from the University pool

SEMESTER – II

PAPER-I: FUNDAMENTALS OF SOIL SCIENCE (Major- 02) CR: 3+1

Sub Code	L	T	P	Duration	IA (T)	ESE (T)	IA (P)	ESE(P)	Total	Credits
UFOBMJT1 UFOBMJP1	3	-	1	5 hours	30	70	30	70	200	4

Objectives:

1. To provide practical knowledge about soil, its components and their properties with relation to forest growth and environment.
2. To provide students exposure on soil formation processes and its role in forest nutrient dynamics.
3. It will provide knowledge about soil, fertilizers, biofertilizers and nutrient management in different ecosystem.
4. Course will develop the ability of students in soil testing and site evaluation for establishing forest plantation.
5. To import knowledge on comprehensive soil physic-chemical properties.

Theory

Unit 1: Concepts of soil and soil science, Composition of Earth crust, Classification- soil forming minerals- definition, classification-silicates, oxides, carbonates, sulphides, phosphates-occurrence.

Unit 2: Weathering of rocks and minerals, weathering factors, Types of weathering- Physical weathering-agents of Physical weathering and their role. Chemical weathering- Solution, hydration, hydrolysis, carbonation, oxidation and reduction, biological agents involved.

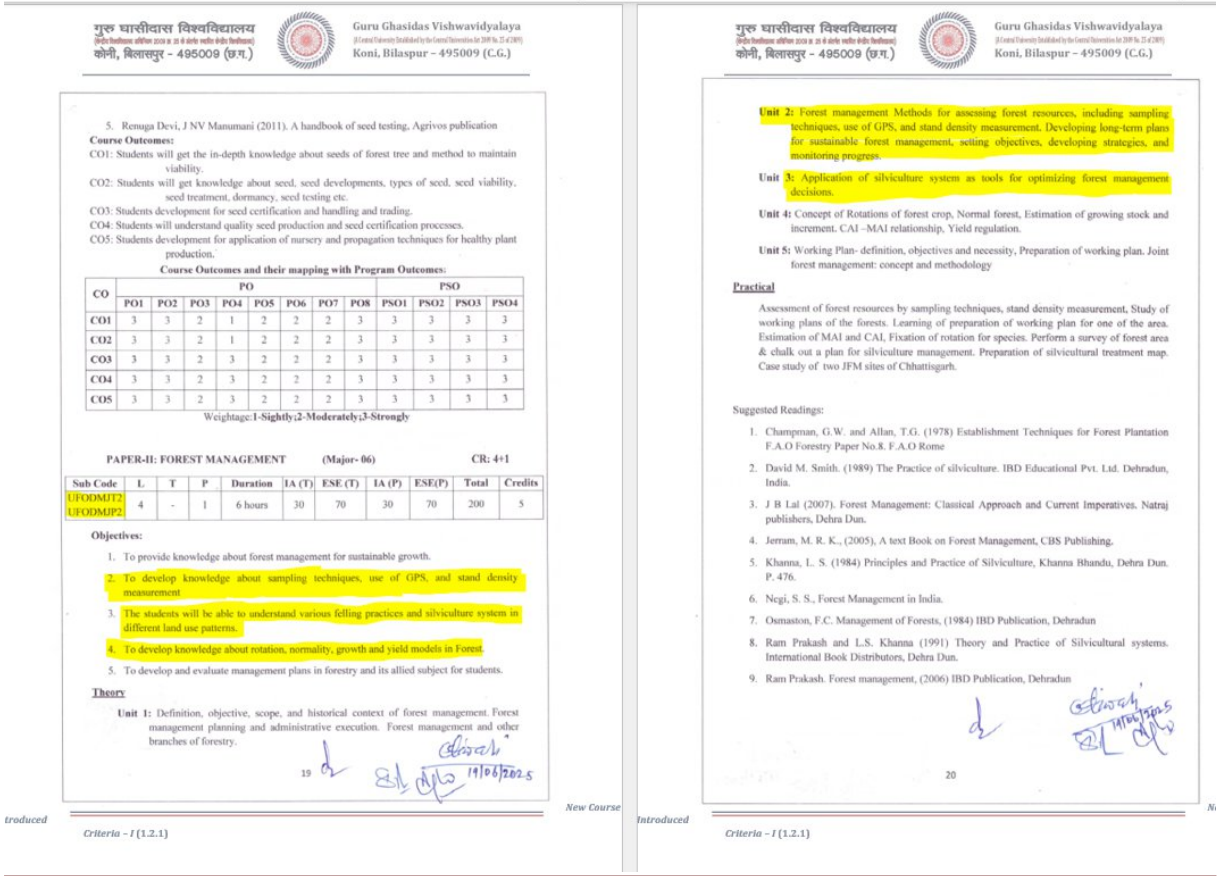
Unit 3: Soil formation, Factors of Soil Formation, Soil classification, Soils of India. Soil profile, Forest soils – distinguishing features; soil physical, chemical and biological properties.

Unit 4: Soil fertility, Essential plant nutrients, Soil organic matter; decomposition, nutrient cycling. Mineral Transformation-Carbon cycle, Nitrogen cycle, Phosphorous cycle, Sulphur cycle. Fertilizers, Bio-fertilizers.

Unit 5: Plant-Soil-Microbes interactions, Mycorrhizal associations, Nitrogen fixation, soil degradation, management interventions of forest soils.

14/04/2025

New Course



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5. Renuga Devi, J NV Manumani (2011). A handbook of seed testing, Agrivos publication

Course Outcomes:

CO1: Students will get the in-depth knowledge about seeds of forest tree and method to maintain viability.

CO2: Students will get knowledge about seed, seed developments, types of seed, seed viability, seed treatment, dormancy, seed testing etc.

CO3: Students development for seed certification and handling and trading.

CO4: Students will understand quality seed production and seed certification processes.

CO5: Students development for application of nursery and propagation techniques for healthy plant production.

Course Outcomes and their mapping with Program Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	1	2	2	2	3	3	3	3	3
CO2	3	3	2	1	2	2	2	3	3	3	3	3
CO3	3	3	2	3	2	2	2	3	3	3	3	3
CO4	3	3	2	3	2	2	2	3	3	3	3	3
CO5	3	3	2	3	2	2	2	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

PAPER-II: FOREST MANAGEMENT **(Major- 06)** **CR: 4+1**

Sub Code	L	T	P	Duration	IA (T)	ESE (T)	IA (P)	ESE(P)	Total	Credits
UFODMJT2 UFODMJP2	4	-	1	6 hours	30	70	30	70	200	5

Objectives:

1. To provide knowledge about forest management for sustainable growth.
2. To develop knowledge about sampling techniques, use of GPS, and stand density measurement
3. The students will be able to understand various felling practices and silviculture system in different land use patterns.
4. To develop knowledge about rotation, normality, growth and yield models in Forest.
5. To develop and evaluate management plans in forestry and its allied subject for students.

Theory

Unit 1: Definition, objective, scope, and historical context of forest management. Forest management planning and administrative execution. Forest management and other branches of forestry.

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Unit 2: Forest management Methods for assessing forest resources, including sampling techniques, use of GPS, and stand density measurement. Developing long-term plans for sustainable forest management, setting objectives, developing strategies, and monitoring progress.

Unit 3: Application of silviculture system as tools for optimizing forest management decisions.

Unit 4: Concept of Rotations of forest crop, Normal forest, Estimation of growing stock and increment, CAI –MAI relationship, Yield regulation.

Unit 5: Working Plan- definition, objectives and necessity, Preparation of working plan. Joint forest management: concept and methodology

Practical

Assessment of forest resources by sampling techniques, stand density measurement, Study of working plans of the forests. Learning of preparation of working plan for one of the area. Estimation of MAI and CAI, Fixation of rotation for species. Perform a survey of forest area & chalk out a plan for silviculture management. Preparation of silvicultural treatment map. Case study of two JFM sites of Chhattisgarh.

Suggested Readings:

1. Champman, G.W. and Allan, T.G. (1978) Establishment Techniques for Forest Plantation F.A.O Forestry Paper No.8. F.A.O Rome
2. David M. Smith. (1989) The Practice of silviculture. IBD Educational Pvt. Ltd. Dehradun, India.
3. J B Lal (2007). Forest Management: Classical Approach and Current Imperatives. Natraj publishers, Dehra Dun.
4. Jerram, M. R. K., (2005), A text Book on Forest Management, CBS Publishing.
5. Khanna, L. S. (1984) Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun. P. 476.
6. Negi, S. S., Forest Management in India.
7. Osmaston, F.C. Management of Forests, (1984) IBD Publication, Dehradun
8. Ram Prakash and L.S. Khanna (1991) Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun.
9. Ram Prakash. Forest management, (2006) IBD Publication, Dehradun

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troduced *New Course* *Introduced* *Criteria – I* (1.2.1)

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PAPER-IV: VOC PAPER (VOC-03) CR: 1+3
Drawn From the University pool

PAPER-V: ABILITY ENHANCEMENT COURSE (AEC-04) CR: 2
Drawn From the University pool

PAPER-VI: SUMMER INTERNSHIP (Compulsory for 2 years diploma course) CR: 4

SEMESTER – V

PAPER-I: Application of RS & GIS in Natural Resource Management (Major- 08) CR: 4+1

Sub Code	L	T	P	Duration	IA (T)	ESE (T)	IA (P)	ESE(P)	Total	Credits
UFOEMJT1 UFOEMJP1	4	-	1	6 hours	30	70	30	70	200	5

Objectives:

1. To give exposure on the use of Remote Sensing, GPS and GIS technique in forestry.
2. To understand the application of remote sensing and GIS technique for the measurement and mapping of forest areas,
3. The assessment of land use land cover changes of forest area using modern tools and technique, Image acquisition, preprocessing and interpretation techniques.
4. The students will learn about the equipment used in forest survey.
5. The students will be able to use the various software's of GIS.

Theory

Unit 1: Introduction to Remote Sensing: Basics of Remote Sensing: Definition, history, and scope, Interaction of EMR with Earth surface features, Platforms and Sensors, Resolution

Unit 2: Satellite Data and Image Interpretation: Types of satellite imagery: IRS, Landsat, MODIS, Sentinel, etc., Image acquisition, preprocessing and interpretation techniques, Supervised and Unsupervised Classification techniques

Unit 3: Fundamentals of Geographic Information System (GIS): Definition and Components of GIS, Spatial and Non-Spatial Data, GIS Data Models: Raster and Vector, Data sources: Maps, GPS, Satellite data, Map projections, GIS software used

Unit 4: GIS Applications in NRM: NRM inventory and assessment using GIS, Forest type and cover mapping, Monitoring deforestation, forest degradation, and encroachment, Forest fire, LULC, Water cover mapping, Wildlife habitat mapping and corridor analysis

Unit 5: NRM Mapping Projects and Case Studies: National and International mapping programs (e.g., NRSC, FSI, FAO), Case studies on forest and watershed cover change detection, Recent trends: UAVs, Drone Mapping, AI in forest mapping.

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SEMESTER – VI

PAPER-I: Forest Pathology and Entomology **(Major- 11)** **CR:4+1**

Sub Code	L	T	P	Duration	IA (T)	ESE (T)	IA (P)	ESE(P)	Total	Credits
UFOFMJT1 UFOFMJP1	4	-	1	6 hours	30	70	30	70	200	5

Objectives:

1. To identify the degrading agents of forest, pest and diseases.
2. To understand the prevention and control measures of diseases associated with trees
3. To learn about the integrated pest management techniques for ecofriendly management of forests pandemic.
4. To know about the pests forest.
5. To develop understanding of forest protection.

Theory

Unit 1: General concept of forest protection. Abiotic and biotic forest damaging agencies. Forest fire and its impact on overall forest health. Forest fire monitoring systems.

Unit 2: Forest pathology: Classification of pathogens damages and cure. Biodegradation of wood - microscopic and chemical effects of white rot, brown rot, soft rot and wood discoloration. Heart rots - factors affecting heart rots, damage caused, compartmentalization of decay in trees and management of heart rots.

Unit 3: Forest entomology: Classification, types of insects and pests and its cure. Different types of the damage and its prevention.

Unit 4: Important diseases on forest trees- Teak, Sal, Shisham, *Acacia, Dalbergia*, Deodar, Pines and *Casuarina*. Biological control of insect pests and diseases of forest trees, Nature of disease resistance.

Unit 5: Principles and methods of integrated pests management; Insect attractants and repellents. Important insect pests of nurseries, plantations, avenue trees and their management. Insect pests of seeds of forest trees and their management.

Practical

Collection, identification and preservation of important insect pests and disease specimens of forest plants. Preparation of culture media and methods of inoculation. Vegetative and reproductive study of pathogens. Detection of insect infestation and seed borne mycoflora. Assessment of losses due to diseases, insect pests etc. Fire control methods and devices. Preparations of different pesticides; Preparation of fungicidal solutions; In-vitro efficacy and In vivo efficacy assessments.

Suggested Readings

1. Bakshi BK. 1976. *Forest Pathology*.Controller of Publications, GOI.
2. Jha LK &SenSarma PK. 1994.*Forest Entomology*.Ashish Publ. House.
3. S SNegi, 2006. *Handbook of Forest Protection*. International Book Dist., Reprint

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SEMESTER – VIII (4 Years Honours course)

PAPER I: BIOSTATISTICS AND RESEARCH METHODOLOGY (Major- 16) CR: 4 + 1

Sub Code	L	T	P	Duration	IA (T)	ESE (T)	IA (P)	ESE(P)	Total	Credits
UFOHMJT1 UFOHMJP1	4	-	1	6 hours	30	70	30	70	200	5

Course Objectives :

1. To provide knowledge about fundamentals of biostatistics and its use in forestry.
2. Make students able to understand the data analysis, data representation and tabulation.
3. To develop the concept for testing hypothesis signification in practical.
4. To understand relationship between two quantitative variables related to the forest.
5. To prove the hypothesis of different research objectives.

Theory

Unit 1: Introduction of forest statistics scales of measurement, types of data, classification and tabulation of data, frequency distribution, diagrammatic and graphical representation.

Unit 2: Central tendency: mean, median, mode, measures of dispersion: range, quartile deviation, mean deviation and standard deviation, probability.

Unit 3: Correlation: Concept, Karl Pearson's coefficient, Spearman rank correlation coefficient, Regression: Regression equations, linear and nonlinear regressions and regression coefficient.

Unit 4: Tests of significance: concept and applications of t-test, paired t-test, Z- test and Chi square test χ^2 –test.

Unit 5: Meaning and objectives of research, research design and planning, research ethics, plagiarism, referencing (APA, Harvard), citations, structure of a thesis/dissertation and scientific paper.

Practical

Handling computer-based histogram, frequency polygon, bar chart, pie chart, construction of frequency distribution table and its graphical representation, measures of central tendency: mean median and mode for raw and grouped data, measures of dispersion: range, mean deviation, quartile deviation and standard deviation for raw and grouped data, correlation and linear regression, t- test, paired-t test, Chi-square test for contingency tables and theoretical ratios.

Suggested Readings:

1. Arora P N (2003) Biostatistics. Himalayan publishers.
2. Arora, P.N. and P.K. Malhan (2016), Biostatistics, Himalaya Publishing House.
3. K.Balaji, A.V.S. Raghavaiah, K.N. Jayaveera (2012), Biostatistics, I.K. International Publishing House Pvt. Ltd. New Delhi.
4. Kenneth N. Berk (1998). Introductory Statistics.www.amazon.com
5. Marcello Pagano and Kimberlee Gauvreau (2008) Principles of Biostatistics. Jhon and Wiley Sons Ltd.

19/06/2025

गुरु घासीदास विश्वविद्यालय
कोनी, बिलासपुर – 495009 (छ.ग.)

Guru Ghasidas Vishwavidyalaya
Koni, Bilaspur – 495009 (C.G.)

MOOCS COURSES

Semester	Course	Course Code	Name of the course	Credit	Hour/ week	Marks
VII	MOOC	UFOGMOC1	Wildlife and its Conservation /MOOC	4	4	100
As per university instruction online/offline MOOC subject will be taught to the student if not available on online platform.						

Unit- 1. Values of wildlife. Wildlife and its scope in India. Types of wildlife and their status. Wildlife depletion and its causes. Wildlife corridors. Wildlife legislation. Wildlife Protection Act, 1972/ 8.

Unit- 2. Wildlife Safari. Wild animals projects. Wildlife and tribal welfare. Wildlife research in India and world. Wildlife education. India's wildlife. Karnataka's wildlife. Wildlife conservation.

Unit- 3.Importance of wild animals and their conservation. Wild animals and artificial insemination and captive breeding. Wildlife sanctuaries. National Parks. Biosphere reserves. Germplasm stations, seed banks and pollen banks. Zoological Gardens in India. Western Ghats

Unit- 4. Eastern Ghats. Himalayan Biodiversity. Government Institutions involved in wildlife research and conservation. NGO's involved in wildlife research and conservation. Ramsar wetlands. Mega biodiversity centres. Biodiversity hotspots. Biodiversity heritage sites.

Unit- 5. Biodiversity profile. Biodiversity Act, 2002. Biodiversity Development Authority (BDA). PBR and BMC's. Protected area network. Biodiversity mapping and prospecting. Wildlife census, techniques and biodiversity index.

19/06/2025

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New Course Introduced *Criteria – I* (1.2.1)

List of New Course(s) Introduced

Department : Forestry, Wildlife and Environmental Sciences

Programme Name : M Sc (Forestry)

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
1.	PGFOAT2/ PGFOAP2	Forest Management
2.	PGFOAOT/ PGFOAOP	Essentials of Environmental Sciences
3.	PGFOBT2 / PGFOBP2	Advances in Agroforestry
4.	PGFOBT4/ PGFOB4	Climate Smart Forestry and Forest Policy
5.	PGFOBT5/ PGFOBP5	Wildlife and its Conservation/MOOCs
6.	PGFOBT6/ PGFOBP6	Forest Genetics and Tree improvement
7.	PGFOCT4/ PGFOCP4	Industrial Safety, EIA and Environmental audit
8.	PGFOCT5/ PGFOCP5	Forest Statistics and Research Methodology

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2024-25

School : Natural Resources

Department : Forestry, Wildlife and Environmental Sciences

Date and Time : July 19, 2025 11:00 am

Venue : HOD room

The scheduled meeting of member of Board of Studies (BoS) of Department Forestry, Wildlife and Environmental Sciences, School of Studies of Natural Resources, Guru Ghasidas Vishwavidyalaya, Bilaspur was held on dated 19.06.2025 at 11:00 am in HOD room to design and discuss the and design the syllabus of B. Sc. (Forestry) 4 Years (8 semester) scheme as per NEP 2020 guidelines, M.Sc. Forestry and Environmental Sciences

curriculum and credit framework/ syllabus as per CBCS guidelines. External Expert has joined the meeting through online mode.

The following members were present in the meeting:

1. Prof. Sanjeev Kumar, External Expert Member, Dean, College of Forestry, Banda University Agricultural and Techology, Banda (UP)
2. Shri Pankaj Sharma, External expert, DGM, Environment Management, NTPC, Sipat, Bilaspur
3. Prof. Dr. S.C. Tiwari, Dean, HoD, Chairperson, BoS, Dept. Forestry, Wildlife and Environmental Sciences
4. Prof. S. S. Dhuria, Member of BOS, Dept. Forestry, Wildlife and Environmental Sciences,
5. Prof. K. K. Chandra, Member of BOS, Dept. Forestry, Wildlife and Environmental Sciences,
6. Dr. Ajay Kumar Singh, Member, BoS, Assistant Professor, Dept. Forestry, Wildlife and Environmental Sciences

Following points were discussed during the meeting

- Revised ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program.
- The BoS has approved the NEP2020 Course curriculum and ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program with effect from academic session 2024-25.
- The BoS has approved the NEP2020 Course curriculum and CBCS ordinance of M. Sc. (Forestry) Two Years (4 Semester) degree program with effect from academic session 2025-26.

Following points were discussed during the meeting:

New curriculum and credit framework- NEP 2020 for B.Sc. Forestry Four Years (8 Semester) degree program was prepared. The details of course and credits are as follows:

List of new Courses

Sr. No.	Course Code	Name of the Course
1.	PGFOAT2/ PGFOAP2	Forest Management
2.	PGFOAOT/ PGFOAOP	Essentials of Environmental Sciences
3.	PGFOBT2 / PGFOBP2	Advances in Agroforestry
4.	PGFOBT4/ PGFOB4	Climate Smart Forestry and Forest Policy
5.	(PGFOBT5/ PGFOBP5	Wildlife and its Conservation/MOOCs

6.	PGFOBT6/ PGFOBP6	Forest Genetics and Tree improvement
7.	PGFOCT4/ PGFOCP4	Industrial Safety, EIA and Environmental audit
8.	PGFOCT5/ PGFOCP5	Forest Statistics and Research Methodology

विभागाध्यक्ष
Head
वानिकी, वन्यजीव एवं पर्यावरण विभाग
Department of Forestry, Wildlife and Environmental Science
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD

Curriculum and Credit Framework

FOR

M.Sc. FORESTRY& ENVIRONMENTAL SCIENCE

(CBCS)

(w.e.f. Academic session:2025-26)

"SCHOOL OF STUDIES OF NATURAL RESOURCES"

DEPARTMENT OF FORESTRY, WILDLIFE & ENVIRONMENTAL SCIENCES

GURU GHASIDAS VISHWAVIDYALAYA

(A Central University established by the Central University Act.2009 No. 25 of 2009)

BILASPUR-495009, CHHATTISGARH

19/6/2025 19/6/25 19/6/2025 19/6/2

Course Structure

M.Sc. Forestry and Environmental Science (2 -Years / 4- Semester)
(CBCS)

Semester	Course Opted	Course Code	Name of the Course	Credit	Hours/ week	Marks
I st SEM	Core-01	PGFOAT1	Advances in Silviculture	3	3	100
	Core-01 Practical	PGFOAP1	Advances in Silviculture	1	3	100
	Core -02	PGFOAT2	Forest Management	3	3	100
	Core -02 Practical	PGFOAP2	Forest Management	1	3	100
	Core-03	PGFOAT3	Forest Biometry, Surveying & Engineering	3	3	100
	Core-03 Practical	PGFOAP3	Forest Biometry, Surveying & Engineering	1	3	100
	Core -04	PGFOAT4	Forest Soil and Watershed Management	3	3	100
	Core -04 Practical	PGFOAP4	Forest Soil and Watershed Management	1	3	100
	OE-01	PGFOAOT	Essentials of Environmental Sciences	3	3	100
	OE-01 Practical	PGFOAOP	Essentials of Environmental Sciences	2	3	100
	TOTAL			**21**	**30**	**1000**
II st SEM	Core -05	PGFOBT1	Remote Sensing and GIS	3	3	100
	Core -05 Practical	PGFOBP1	Remote Sensing and GIS	1	3	100
	Core -06	PGFOBT2	Advances in Agroforestry	3	3	100
	Core -06 Practical	PGFOBP2	Advances in Agroforestry	1	3	100
	Core-07	PGFOBT3	Forest Products & Utilization	3	3	100
	Core-07 Practical	PGFOBP3	Forest Products & Utilization	1	3	100
	Core -08	PGFOBT4	Climate Smart Forestry and Forest Policy	3	3	100
	Core -08 Practical	PGFOBP4	Climate Smart Forestry and Forest Policy	1	3	100
	Core -9	PGFOBT5	Wildlife and its Conservation/MOOCS	3	3	100

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	Core -9 Practical	PGFOBP5	Wildlife and its Conservation/MOOCS	1	3	100
	Core -10	PGFOBT6	Forest Genetics and Tree improvement	3	3	100
	Core -10 Practical	PGFOBP	Forest Genetics and Tree improvement	1	3	100
	Internship	PGINTBI	**Summer Internship (Two weeks)**	**Non-credit**		
	TOTAL			**24**	**36**	**1200**
III[rd] SEM	Core 11	PGFOCT1	Wood Science and Technology	3	3	100
	Core 11 Practical	PGFOCP1	Wood Science and Technology	1	3	100
	Core-12	PGFOCT2	Forest Protection	3	3	100
	Core-12 Practical	PGFOCP2	Forest Protection	1	3	100
	Core 13	PGFOCT3	Forest Ecology and Biodiversity Conservation	3	3	100
	Core-13 Practical	PGFOCP3	Forest Ecology and Biodiversity Conservation	1	3	100
	Core 14	PGFOCT4	Industrial Safety, EIA and Environmental audit	3	3	100
	Core-14 Practical	PGFOCP4	Industrial Safety, EIA and Environmental audit	1	3	100
	Core -15	PGFOCT5	Forest Statistics and Research Methodology	3	3	100
	Core -15 Practical	PGFOCP5	Forest Statistics and Research Methodology	1	3	100
		TOTAL		**20**	**30**	**1000**
IV[th] SEM		PGFODD1	Dissertation	**19**	**36**	**400**
Grand total				**84**	**132**	**3600**

Examination marking system

Each course will be evaluated as followings:

Sub Code	L	T	P	Duration	IA	ESE (T)	ESE (P)	Total	Credits
	3	-	1	5 hours	30	70	100	200	4

- **Dissertation:** The dissertation topic will be allotted to the student in III Semester. It will be evaluated at the end of IV Semester. Students will choose research topic on his/her own interest on the topics related to forestry, wildlife and environmental sciences and will work under the supervisor allotted by the department.
- The Dissertation will be evaluated by the external examiner appointed by the competent authority of the University. Based on student dissertation report, presentation and viva voce the total marks (400) will be evaluated as; Dissertation report (Quality, content, statistics, graphic and figures/table etc.) 200 marks, Seminar (PPT Presentation) 100 marks, viva voce (Domain Knowledge and communication skills) - 100 marks.
- **Summer internship:** Students will complete the internship with forest department, Forest institutes, NGOs, and forest based industries/Nursery to learn about the various forest' operations, functioning of forest based industries and institutes or other organization as per their interest. However, he/she has to present certificate of internship and will make a presentation/ seminar at the end of the internship. The evaluation/ validation of internship will be done by the external/ internal examiner/HOD, based on student seminar/presentation.
- Two mid-term exams of 15 marks each (total 15+15-30) will be conducted considering summative and formative methods. End semester exam marks will be held of total 70 marks. The practical/dissertation courses will be evaluated for the total marks during the end semester only.
- **MOOCS:**- The students will be encouraged to register for the MOOCS course. However if students fail to register the course will be taught by the department.

PAPER II : Forest Management

Course Objectives:

1. To provide knowledge about the forest management and organizational setup of forest department.
2. Students will get knowledge about forest asset evaluation and yield regulations
3. Students will be able to understand felling practices and silviculture systems.
4. To develop understanding on the sustainability components for forest resources management practices.
5. To make students aware about contemporary forest policies and national strategies for forest management and conservation

Theory

Unit 1

Principles of forest management, application and scope, Forest organizational setup of MoEF&CC and State forest department. Development of forest management in India.

Unit 2

Concept of Normality, Rotation: Meaning and types. Increment, Types of increment, Yield: Types of yield, Yield regulation in forest Management. Working plans and working schemes and their role in Forest Management.

Unit 3

Silviculture system, its types and applications in Forest Management, Clear felling, shelterwood, selection and coppice system, bamboo forest Management.

Unit 4

Population growth and resource management. Management of Common Property Resources (CPRs) Concept of sustainability, SFM and its monitoring and evaluation. Micro-level planning and participatory rural appraisal.

Unit 5

Contemporary forest policies and national strategies and action plans for SFM asCarbon credit, CIFOR, REDD, REDD+ CAMPA, JFM, Assistant Natural Regeneration. Concept of sustainable tourism and people's participation.

Practical

Study of working plans of the forests. Estimation of MAI and CAI, Fixation of rotation for species. Perform a survey of forest area & chalk out a plan for silviculture management and preparation of silvicultural treatment map. Practice of Participatory Rural Appraisal technique. Preparation of micro plan for sustainable forest management. Resource survey and preparation of resource map. Exercise on designing training program for sustainable forest management..

Suggested Readings:

1. Champman, G.W. and Allan, T.G. (1978) Establishment Techniques for Forest Plantation F.A.O Forestry Paper No.8. F.A.O Rome
2. David M. Smith. (1989) The Practice of silviculture. IBD Educational Pvt. Ltd. Dehradun, India.
3. J B Lal (2007). Forest Management: Classical Approach and Current Imperatives. Natraj publishers, Dehra Dun.
4. Jerram, M. R. K., (2005), A text Book on Forest Management, CBS Publishing.
5. Khanna, L. S. (1984) Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun. P. 476.
6. Negi, S. S., Forest Management in India.
7. Osmaston, F.C. Management of Forests, (1984) IBD Publication, Dehradun
8. Ram Prakash and L.S. Khanna (1991) Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun.
9. Ram Prakash. Forest management, (2006) IBD Publication, Dehradun
10. Anonymous .2006.Report of the National Forest Commission. Govt. of India, New Delhi.

15. Annamalai R. 1999. Participatory Learning Action and Microplanning for JFM. Dean SFRC, Coimbatore. FAO 1978.

16. Forestry for Local Community Development. FAO Publ. Shah SA. 1988.

Forestry for People. ICAR. Tiwari KM. 1988.

17. Social Forestry and Rural Development. International Book Distr. Vyas GPD. 1999. Community Forestry.

Course outcome:

1. Student will be able to understand the management and organizational setup of the forest department.

PAPER V: ESSENTIALS OF ENVIRONMENTAL SCIENCES CR. 5 (3+2)

Course Objectives:

1. To understand the basic concepts of environment and atmosphere.
2. To gain knowledge of Ecosystem structures and functions and biodiversity.
3. To understand the environmental pollution, its causes, impact and mitigation measures.
4. To study climate change, Global warming and carbon footprint assessments.
5. To learn about international environmental agreements and initiatives.

Theory

Unit – I

Environment: Definition, Scope and Component of environment. Atmospheric environment: definition, concept, structure (Layers) and composition of Atmospheric environment. Hydrosphere, Lithosphere, Biosphere.

Unit – II

Ecosystem: Definition and concepts of ecosystem, component of ecosystem, functions and structures of ecosystem, energy flow in ecosystem, food chain, food web, ecosystem pyramids, Different types of ecosystem, bio-geochemical cycles. Biodiversity: definition, threats and conservation of biodiversity (In-situ and Ex-situ conservation)

Unit – III

Environment Pollution: definition, concept, types. Air, water and soil pollution: major pollutants, causes and mitigation measures. Effects of environment pollution on human health and other organisms. Solid waste management: types of solid waste, collection and transportation of solid waste, waste treatment and disposal techniques.

Unit – IV

Global warming: definition causes and effects of global warming. Green house gases (GHGs). Climate change: Causes and impacts of climate change. Carbon Footprint: Concept, carbon sources and sinks, assessment methods of carbon footprint. EIA: steps and process.

Unit – V

Environmental Conventions, Agreements & Indian Initiatives: International agreements and policies -Ramsar Convention, Stockholm Convention, IPCC, Kyoto Protocol, COPs, Paris Agreement, Montreal Protocol. National policies & schemes: MoEFCC, CBD, G20 Summit, Green India Mission.

Practical

- Determine air pollution levels using biological indicators, such as lichen or leaf chlorosis studies.
- Analyze water samples for pH, turbidity, dissolved oxygen, and heavy metal presence using standard water testing kits.

- Study the effect of industrial effluent on seed germination or plant growth to assess toxicity levels.
- Develop a climate change impact poster or model showcasing effects on forests, agriculture, and biodiversity.
- Simulate bioremediation experiment using pollutant-absorbing plants.
- Calculate personal or institutional carbon footprint using online calculators or manual estimation methods.
- Prepare a report on international and national environmental agreements, highlighting their objectives.

Suggested Readings

Anonymous (2006) .Report of the National Forest Commission. Govt. of India, New Delhi.

E. Claussen, V. A. Cochran, and D. P. Davis. (2001). Climate Change: Science, Strategies, & Solutions, University of Michigan.

Huxley P. (1999). Tropical Agroforestry. Blackwell Science.

Koskela J, Buck A & Teissier du Cros E. (2007). Climate Change and Forest Genetic Diversity: Implications for Sustainable Forest Management in Europe. Biodiversity International; Rome, Italy.

Streck, C et al, (2006). Climate Change and Forests Emerging Policy and Market Opportunities Today & Tomorrow's Printers and Publishers New Delhi.

Course Outcome:

1. Students will be able to describe environmental concepts and atmospheric terminologies
2. Students will learn about Ecosystem services and biodiversity.
3. Students will understand different types of pollution Air, water and soil pollution causes and their mitigation methods.
4. Students will explain climate change impacts and calculate carbon footprint.
5. Students will recognize global agreements and national policies contributing to environmental sustainability.

	PO					PSO		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	2	1	1	3	3	3	1
CO2	3	3	3	1	2	3	3	2
CO3	3	2	2	1	3	3	3	1
CO4	3	3	2	1	3	3	2	2
CO5	3	2	1	2	2	3	3	2

PAPER II: ADVANCES IN AGRO-FORESTRY CR 4 (3+1)

Course Objective:

1. To impart knowledge on the concept of agroforestry as a sustainable land use system
2. To acquainted about tree crop interactions and their quantification.
3. To evaluate the parameter of biodiversity, sustainability, carbon trading and of climate smart agroforestry.
4. To boost the diagnostic ability of the students to design innovative and climate resilient agroforestry systems.
5. To enrich student understanding on preparation of commercial/bankable A/F proposals.

17

Theory

Unit 1: Agroforestry: objectives, importance, potentials and limitations for implementations. Basis of classification of agroforestry systems. Structural and functional attributes of agroforestry systems, shifting cultivation, alley cropping, silvopastoral systems, shelter-belts and windbreaks, and home gardens.

Unit 2: Tree-crop interphase- factors affecting form and function in woody and non-woody plant component. Nature and types of interactions- positive and negative, aboveground and belowground interactions- competition, complementarity in resource sharing. Tree architecture and canopy management.

Unit 3: Agroforestry in soil productivity and moisture conservation. Nitrogen fixation and nutrient pumping. Agroforestry and biodiversity conservation (micro-site enrichment). Concept of sustainability and carbon trading/credit. Litter and fine root dynamics. Climate smart forestry.

Unit 4: Diagnosis and Design, PRA and RRA tools in agroforestry problem diagnosis. SWOT analysis of existing agroforestry practices.

Unit 5: Case studies on different agroforestry models (Teak, Eucalyptus, Moringa, Popular, Mango, etc.). Technical and financial analysis of various commercial A/F models.

Practical

Survey and analysis of land use systems in the adjoining areas; Study of tree crown architecture; Design and plan of suitable models for improvement; PRA-RRA tools in agroforestry problem diagnosis. Field survey and acquaintance with specialized features of trees, shrubs and fruit species and varieties for Agroforestry; Planting plans including wind breaks; Training and pruning of forest trees, shrubs and fruit trees for enhancing production in agroforestry system. Different methods for quantifying interactions; Studies on allelopathy, determination of microclimate modifications, tree-soil-crop interactions; Measurement and

determination of microclimate modifications, tree-soil-crop interactions; Measurement and interpretation of light interception in agroforestry systems; Interpretation of yield responses to shelter, soil and water, quantifying root distribution. Biodiversity assessment, carbon sequestration estimation.

Suggested Readings:

Chandra and Rajesh Kumar. 2024. Forestry Practicals (A complete practical solution for students) Scientific Publisher, Jodhpur, India

Dhyani, S. K. 2014. Agroforestry Systems in India. New Delhi: ICAR.

FAO. 2019. Climate-Smart Forestry Guide. http://www.fao.org/climate-smart agriculture/en/.

15/6/24

FAO. 2019. Agroforestry Resources. Available at: http://www.fao.org/forestry/en/.

Garrity, D. P. 2012. Agroforestry for Food Security. Wallingford: CABI.

ICAR. 2020. Agroforestry Framework. Available at: https://www.icar.gov.in/.

Jha, C. S. 2016. Agroforestry Practices in India. New Delhi: Oxford & IBH.

Jose, S. 2012. Agroforestry Ecosystem Services. Agroforestry Systems.

Kumar, A. 2018. Agroforestry in India. Dehradun: ICFRE.

Kala, C. P. 2019. Agroforestry Livelihoods. Dehradun: Bishen Singh Mahendra Pal Singh.

Leakey, R. R. B. 2017. Multifunctional Agroforestry. Amsterdam: Elsevier.

Mbow, C. 2014. Agroforestry and Sustainability. Agroforestry Systems.

MoAFW. 2014. National Agroforestry Policy. Available at: http://agricoop.nic.in/.

Nair, P. K. R. 2012. Agroforestry Principles (2nd ed.). Dordrecht: Kluwer Academic.

Sharma, B. D. 2017. Traditional Agroforestry Systems. New Delhi: Concept Publishing.

UNEP. 2021. Agroforestry Sustainability. Available at: https://www.unep.org/.

Course Outcome:

1. Students will gain knowledge on the concept of agroforestry as a sustainable land use system
2. Students will understand about tree crop interactions.
3. Students will be able evaluate carbon trading of climate smart agroforestry.
4. Students will be able to design innovative and climate resilient agroforestry systems.
5. Students will be able to evaluate commercial/bankable A/F proposals.

	PO	PSO

PAPER IV: CLIMATE SMART FORETRY AND FOREST POLICY CR.4 (3+1)

Course objectives:

1: To develop the knowledge of climatic condition with reference to the global prospective.

2: To understand the different types of forest and its resilience in the nature.

3: To understand the carbon management in the natural and artificial conditions.

4: To develop the mitigation techniques in the students mind.

5: To understand the different treaties and the laws of the global climate change.

Theory

Unit : 1 Climate-Smart Forestry Principles : Integrating climate resilience into forest management; India's Green India Mission.

Unit 2: Adaptive Management: Species selection for drought and heat tolerance; soil conservation for climate resilience.

Unit 3: Mitigation Techniques, Enhancing carbon sequestration through agroforestry and reforestation; biochar applications.

Unit 4: Community-Driven Approaches: Engaging local communities in climate-smart practices; alignment with India's NDCs.

Unit 5: forest climate dynamics: modeling impacts on tree growth and species shift in Indian forest scenario.

Practical

- Resilient planting : Establish a plot with climate-adapted species.
- Sequestration study : Measure carbon storage in a managed forest.
- Community training : Train locals on climate-smart techniques.
- Field visits : Explore a climate-smart forestry project.

Suggested

- FAO. (2019). Climate-Smart Forestry Guide. FAO.
- Ravindranath, N. H. (2011). Climate Change and Indian Forests. Oxford University Press.
- Locatelli, B. (2018). Forests and Climate Change. CIFOR.

Open-Access: MoEFCC. (2015). Green India Mission. http://www.moef.gov.in/.

Course Outcomes:

1: Students will get knowledge about carbon sequestration in forest and its natural management.

2: The subject knowledge will help the students for further career development.

3: Students will understand scientific methods of wildlife management and conflict resolution techniques.

PAPER V: WILDLIFE AND ITS CONSERVATION CR.4 (3+1)

Course Objectives:

1. To study the concepts, classification, and ecological significance of wildlife and its habitats.
2. To understand wildlife ecology, including population dynamics, food chains, behavior, and adaptations.
3. To explore the biological basis of wildlife management and tools like biotelemetry and forensic analysis.
4. To study wildlife conservation strategies, protected areas, and special conservation projects for endangered species.
5. To familiarize students with wildlife legislation, policies, and the role of conservation organizations.

Theory

Unit –I

Wildlife: definition, concept, values of wildlife. Zoological classification and Biogeographical classification of wildlife. Characteristics and distribution of wildlife. Wildlife biology: basic concepts, wildlife habits and habitat, component of wildlife.

Unit –II

Wildlife Ecology: introduction, definition, habitat, Ecological structures and food chains of wildlife, population ecology of wildlife. Sign and symptoms of wildlife. Animals behavior and adaptations of wildlife.

Unit –III

Biological basis of wild life management: definition and scope, breeding potential, saturation point, biological surplus, carrying capacity, population dynamics. Management of shelter, food, and water. Biotelemetry, Forensic Analysis, Wildlife pathology, wildlife crimes, Human wildlife conflict.

Unit –IV

Wildlife conservation: Definition, Concept, significance. Wildlife conservation: In-situ and Ex-situ wildlife conservation. Role of protected area in wildlife conservation. Role of National parks and sanctuaries for conservation of wildlife. Ramsar wetlands. Special conservation projects for endangered species: Project tiger, Gir Lion Project, Crocodile Breeding Project, elephant project etc. Endangered and Threatened Species

Unit –V

Wildlife Policy and Legislation: Wild life protection act 1972, Scheduled animals, National Wildlife Action Plans (NWAP), Tiger census, National Park and Sanctuaries of Chhattisgarh. Wildlife Conservation organization: role and significance of National and International organization in

wildlife conservation. Role of protected area in wildlife conservation. Role of National parks and sanctuaries for conservation of wildlife. Ramsar wetlands. Special conservation projects for endangered species: Project tiger, Gir Lion Project, Crocodile Breeding Project, elephant project etc. Endangered and Threatened Species

Unit –V

Wildlife Policy and Legislation: Wild life protection act 1972, Scheduled animals, National Wildlife Action Plans (NWAP), Tiger census, National Park and Sanctuaries of Chhattisgarh. Wildlife Conservation organization: role and significance of National and International organization in wildlife conservation.

Practical

- Identify wildlife signs and symptoms (like pugmarks, droppings, traits, sounds) using field guidebooks or trail cameras.
- Prepare a report on in-situ and ex-situ conservation practices through case studies of national parks and zoological parks.
- To prepare case study on a special conservation project such as Project Tiger or Gir Lion Project.
- Demonstrate the use of biotelemetry tools and techniques through models or video demonstrations.
- Analyze a wildlife crime case study to understand wildlife forensic analysis and legal procedures.

Suggested Readings

Agarwal, K.G.,2000. *Wildlife of India: Conservation and management*, Nidi Publishers India.

Gopal Rajesh.,1993. *Fundamentals of wildlife management*, Justice Home Publication, Allahabad.

Hosetti B.B, 1997. *Concept of Wildlife management*, Daya Publishing House, Delhi.

James, *A.* 1984 *Principles of wildlife management*, Inc. Bailey, John Wiley & Sons,New York.

Hunter, M.L. Jr.,1990. *Wildlife forest and forestry principals of managing forest for Biological diversity*, Printice Hall,.

Singh, S K., 2009. *Textbook of Wildlife Management*, Today & Tomorrow's Printers and Publishers New Delhi.

Stephen H, Berwick and V.B, Sharia, 1995.Wildlife *Research and management*, Oxford University Press, Oxford.

S.K. Tiwari, Wildlife Sanctuaries in India.

PAPER-VI: FOREST GENETICS AND TREE IMPROVEMENT CR: 3+1

Objectives:

1. To acquaint the students about cell biology, tree breeding and genetic resource conservation in forestry.
2. To develop skill related to practical aspects of the role of biotechnological approaches, tissue culture, macro-propagation, transgenic technology in the field of forestry.
3. To aware the students about the importance of the subject in the field of clonal forestry.
4. Two develop the selection skill of genetically superior tree.
5. To understand the applied aspect of tree improvement program.

Theory

Unit I-Basic genetics principles – Plant cell structure and function, cell reproduction (Mitosis and Meiosis); Structure of DNA and RNA; Structure of chromosome, chromosomal aberration.

Unit II-Mendel law of inheritance, deviation from Mendel law; Complementary gene, duplicate gene, pleiotropy, co-dominance, incomplete dominance, gene interaction.

Unit III-Heritability, genetic advance, genetic gain, combining ability, Hardy-Weinberg equilibrium.Tree breeding – Variation in trees, natural variation, geographic variation.

Unit IV-Selection and management, plus tree selection, species and provenance selection, progeny testing. Quality seed production technology – seed orchard, seed production area, selection of seed tree, plus tree and elite tree.

Unit V-Introduction to forest tree improvement – Reproduction, pollination, genetic variable, qualitative and quantitative genetics, plant tissue culture, biotechnology, genetic engineering, mutation, plant breeding, breeding methods, selection, and its importance.

Practical

Preparation of slides for Mitosis/Meiosis, Testing viability and germination of pollen and seeds. Numerical analysis of population genetics questions, Plus tree selection, Variation analysis in a forest population, Numerical questions on quantitative genetics, Study of pollination system of some tree species. Pollen viability and germination tests. Visitation rate and foraging behaviour of Pollinators. Practice of cutting, grafting, budding and air layering. Use of growth regulators in seed and vegetative propagation; selection and maintenance of mother trees, collection of scion; Micrografting.

Suggested Readings:

1. Datta, M., and Saini, G.C. (2009). *Forest Tree Improvement & Seed Technology*, International Book Distributor, Dehradun.
2. FAO. (1985). *Forest Tree Improvement*, FAO Publication, Rome, Italy.
3. Fins, L., Friedman, S.T. and Brotschol, J.V. (1992). *Handbook of Quantitative Forest Genetics*, Kluwer Academy, Dordrach, London.
4. Khan I.M. (2014). *Forest Biotechnology*, Today and Tommorow Publishers, New Delhi.
5. Mandal, A.K. and Gibson, G.L. (eds) (1997). *Forest Genetics and Tree Breeding*, CBS Publisher & Distributor, New Delhi.

PAPER IV- INDUSTRIAL SEFTY, EIA AND ENVIRONMENTAL AUDIT Cr.4 (3+1)

Course Objectives:

1. To understand the concepts, procedures, and guidelines related to Environmental Impact Assessment (EIA).
2. To study about environmental auditing, its phases, techniques, and international environmental standards.
3. To understand the scope and types of industrial hazards, and the importance of occupational health and safety.
4. To study industrial safety laws, emergency response mechanisms, and accident prevention strategies.
5. To develop understanding of environmental risk analysis, including risk identification, communication, and management.

Theory

Unit – I

Environmental Impact Assessment (EIA): Definition, Concept, Categorization of project, steps and procedure of EIA, Authority involved in EIA process, EIA guidelines 1994, EIA of development projects, EIA of restored mine lands.

Unit – II

Environmental Audit: introduction, definition, types of environmental audit, phases of environmental audit process (Pre-audit, onsite- audit, post-audit). Tools and techniques of environmental audit. Environmental standards: ISO 14001.

Unit – III

Industrial safety and occupational health hazard: definition, needs, scope of industrial safety. Types of industrial hazards: mechanical, electrical, thermal, fire, radiation and explosion hazard.

Techniques of hazard identification. Occupational health and safety of workplace.

Unit-IV

Industrial Safety laws and Standards: Indian factories Act, Explosive Act, BIS, OSHA standards, ISO 45001, Occupational health and safety management system. Accident Prevention and Emergency Response during industrial hazards: Causes of accidents, prevention strategies, safety drills, first aid, and fire-fighting techniques.

Unit-V

Environmental Risk analysis: Definition, Concept of Risk, Distinction between hazard and risk, Sources of environmental risk, types of risks, Risk characterization, purposes of environment risk assessment. Risk communication, Risk management strategies, Tools and techniques of risk analysis.

Practical

- Prepare a mini Environmental Impact Assessment (EIA) report for a small-scale development project.
- Conduct a safety audit and hazard identification in an industrial or laboratory setup using a standard checklist.
- Measure noise and light intensity in a workplace using a sound level meter and lux meter.
- Prepare a sample Environmental Audit report of different activities
- Survey and identify various industrial hazards (mechanical, electrical, thermal, etc.) in a local industrial setup or case study
- Demonstrate the use of Personal Protective Equipment (PPE) and prepare a safety checklist for workplace health.
- Analyze a case study of an environmental disaster (e.g., Bhopal gas tragedy) to understand risk communication and management.

Suggested readings

1. Botkin and Keller. (2012). 'Environmental Science, John Wiley & Sons Inc., Wiley India (P) Ltd., New Delhi. Eighth Edition.
2. Krishnamoorthy, B. (2009). Environment Management -Text and Practices, New Delhi: Prentice Hall India. www.prenticehall.india.org second edition
3. Rajgopalan R., (2016). 'Environmental Studies - from crisis to cure', Oxford University press, New Delhi. Third Edition.
4. Santra S.C., (2014). 'Environmental Science', New Central Book Agency Pvt. Ltd, Kolkata. Third Edition.
5. Krishnamoorthy, B. (2009). Environment Management -Text and Practices, New Delhi: Prentice Hall India. www.prenticehall.india.org third edition
6. Karpagam M. and Jaikumar G. (2010), 'Green Management – Theory and Applications' Ane Books Pvt. Ltd. New Delhi.
7. Manahan, S.E. (1997). Environmental Science and Technology. Lewis, New York.
8. Metcalf and Eddy (Eds). (2003), Wastewater Engineering: Treatment and Reuse, Tata McGraw-Hill, New Delhi.
9. Thomas, J.A. and Fuchs, R. 2002. Biotechnology and Safety Assessment. Academic Press.
10. Wang L.K. Hung Y.T. nad Shammas N.K.(Eds). 2006. Advanced Physicochemical Treatment Processes. Springer-Verlag New York, LLC.

Course Outcome:

1. Students will be able to explain the **steps and application of EIA** in evaluating development and mining projects.

PAPER V.FOREST STATISTICS & RESEARCH METHODOLOGY

Course Objectives:

1. To learn about bio statistics, experimental designs.
2. To develop understanding of the data handing, tabulation.
3. To learn the uses of different statistical software.
4. To learn about forest based experiment
5. To develop understanding of the graphical representation

Theory

UNIT I: Introduction to statistics & data types

Importance of statistics in forestry and environmental sciences, scales of measurement, types of data: qualitative, quantitative, continuous, discrete, classification and tabulation of data, frequency distribution, diagrammatic and graphical representation.

UNIT II: Descriptive Statistics and Probability

Central tendency: mean, median, mode, measures of dispersion: range, quartile deviation, mean deviation and standard deviation, variance, covariance, basic concept of probability.

UNIT III: Correlation and Regression

Concept of variables, correlation: Karl Pearson's coefficient, Spearman rank correlation coefficient, regression: regression equations, linear and nonlinear regressions and regression coefficient.

UNIT IV: Statistical Inference and Hypothesis Testing

Concept of sampling and sampling methods (random, stratified, systematic), Population and sample, parametric and non parametric tests of significance: t- test, paired t-test, Z- test and χ^2 –test.

UNIT V: ANOVA and experimental designs

Analysis of Variance (ANOVA) - one way and two way analysis of variance, experimental designs: basic concept, principles of experimental designs, Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD), Split Plot and Strip Plot Designs, Comparisons of all experimental designs, SPSS, PAST and other online tools of statistical analysis.

Practical

Identification of source of data qualitative and quantitative parameters, arrange forest based statistical data in group, class and table, represent in different diagram and graphical ways, frequency distribution, forest based measurements: calculation of mean, median and mode of measured characteristics of different tree species, finding out the relationship between the height and DBH of some forest tree species-correlations and regressions, testing the hypothesis under t-test,z- test and χ^2-test.

ANOVA under the different types of designs: Completely Randomized Block Design, Randomized Block Design, Latin Square Design, application of SPSS, PAST and other online tools for statistical analysis

Suggested Readings

Forestry Statistics India, 1996. Indian Council of Forestry Research and Education.

Mead R & Relay J. 1987. Statistical Tools for Agro-Forestry Research - Bivariate Analysis for intercropping Experiments. ICRAF, Nairobi.

Surendran C, Sehgal R N & Paramathma M. 2003. Statistical Methods for Agricultural Workers. ICAR.

Rangaswamy, R. A. 2010. Text Book of Agricultural Statistics, New Age International Pvt Ltd Publisher, ISBN-9788122425925, 9788122425925

Chandel, S R S: 2014. A Handbook of Agricultural Statistics, Impact Publisher

Course Outcome:

1. Student will be able to differentiate sources of observation to arrange in groups, classes and tables, competency for data handling, graphical designing and test of experimental data statistically
2. Student will be competent to analyze mean, median, mode, measures of dispersion, variance and probability
3. Student will be able to analyze the relationship between different variables correlation & regression coefficient.
4. Student will be able to do sampling in forest area and able to perform test of significance of different parametric and non parametric test
5. Student will be able to the layout experimental designs, expertise on different statistical packages used for data analysis

	PO					PSO		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	2	1	1	3	3	3	1
CO2	3	3	3	1	2	3	3	2
CO3	3	2	2	1	3	3	3	1
CO4	3	3	2	1	3	3	2	2
CO5	3	2	1	2	2	3	3	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly