SYLLABUS FOR

FOUR YEAR UNDER GRADUATE PROGRAMME (FYUGP) IN FORESTRY

(2024 Admission onwards)

Foreword

The Four-Year Undergraduate Programme (FYUGP) in Forestry is undergoing significant changes to better meet the needs of students, industries, and society. Education is seen as vital, and it's essential that the courses offered reflect the demands of the modern world. This means regularly updating the curriculum to keep pace with changes in society and the economy.

It is crucial for higher education to equip students with practical skills that are directly relevant to their chosen fields. However, despite the increasing number of people attending college, there are concerns about whether the education they receive adequately prepares them for the workforce. This is particularly true when it comes to skills that employers are looking for.

As our world becomes more interconnected and fast-paced, it's essential for educational institutions to evolve and teach students the skills they need to succeed in the 21st century. This includes not only technical skills but also critical thinking, communication, and adaptability. In the field of forestry, there is an urgent need to focus on forest conservation, biodiversity preservation, and sustainable management of forest resources. The curriculum must address these critical issues to prepare students to tackle the environmental challenges of our time. Topics such as ecosystem services, climate change mitigation, and the socio-economic aspects of forest management are essential components of a modern forestry education.

The government of Kerala is taking proactive steps to improve higher education by setting up commissions to recommend changes to policies, regulations, and evaluation systems. These efforts include a focus on integrating forest conservation principles into the educational framework.

As part of these efforts, the undergraduate curriculum, including the FYUGP in Forestry, is being restructured to better align with the goals of creating a knowledgeable society capable of driving sustainable development. These changes aim to ensure that higher education remains relevant and beneficial for both students and society as a whole, fostering a new generation of forestry professionals equipped to protect and manage our vital forest resources.

Aneesh K S,
Chairperson,
BoS, UG Forestry

Preamble

Welcome to the Four-Year Undergraduate Programme (FYUGP) in BSc Forestry at Kannur University. This syllabus has been carefully crafted to provide students with a comprehensive understanding of the vital field of forestry while equipping them with the necessary skills to thrive in today's dynamic environment.

Forestry, the science and art of managing forests, trees, and related natural resources, is a field of immense importance for ecological balance, biodiversity conservation, and sustainable development. As we witness rapid advancements in science and technology, the study of forestry continues to evolve, presenting new opportunities and challenges.

This syllabus aims to blend theoretical knowledge with practical applications, offering students a well-rounded education that prepares them for both academic pursuits and professional endeavours. Through a combination of classroom lectures, laboratory experiments, fieldwork, and research projects, students will delve deep into the intricate world of forest biology, exploring topics such as forest ecology, silviculture, forest management, conservation biology, wildlife management, and environmental policy.

At Kannur University, we are committed to providing our students with a stimulating learning environment that fosters curiosity, critical thinking, and a passion for discovery. We encourage active participation, independent thinking, and collaborative learning, ensuring that our graduates emerge as confident and competent individuals ready to make meaningful contributions to society.

This syllabus represents our dedication to academic excellence, innovation, and continuous improvement. We believe that by nurturing a deep appreciation for forests and natural resources and instilling a sense of responsibility towards environmental stewardship, our students will become future leaders who can address the pressing challenges facing our planet, including climate change, deforestation, and biodiversity loss.

We extend our best wishes to all students embarking on this educational journey and trust that their time spent studying forestry at Kannur University will be enriching, rewarding, and transformative.

KANNUR UNIVERSITY

Vision and Mission Statements

Vision: To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasaragod and Kannur Revenue Districts and the Manandavady Taluk of Wayanad Revenue District.

Mission:

- To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.
- To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.
- To uphold democratic, multicultural, secular, environmental and gender sensitive lues as the foundational principles of higher education and to cater to the modern notions of equity, social justice and merit in all educational endeavours.
- To affiliate colleges and other institutions of higher learning and to monitor academic ethical, administrative and infrastructural standards in such institutions.
- To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.
- To associate with the local self-governing bodies and other statutory as well as nongovernmental organizations for continuing education and also for building public awareness on important social, cultural, and other policy issues.

BOARD OF STUDIES - FORESTRY (UG)

Chairperson		
1	Aneesh K S	Assistant Professor, Department of Forest Resource Management, College of Forestry, Vellanikkara, KAU.
Members		
2	Aparna P	Assistant Professor, Department of Botany, Sree Narayana College, Kannur.
3	Resmi P Thomas	Assistant Professor, Department of Botany, Sree Narayana College, Kannur.
4	Malik Fasil M	Assistant Professor, Department of Wildlife Science, College of Forestry, Vellanikkara, KAU.
5	Dr. Ganesh Gopal T M	Assistant Professor, Department of Wood Science and Technology, Mangattuparamba Campus, Kannur University.
6	Dr. Manoj K	Assistant Professor, Department of Environmental Studies, Mangattuparamba Campus, Kannur University.
7	Dr. P Balakrishnan Peroth	Sr. Scientist, Department of Wildlife Biology, Kerala Forest Research Institute, Thrissur.
8	Dr.Amruth M	Sr. Scientist, Department of Sociology, Kerala Forest Research Institute, Thrissur.
9	Dr. Santhosh Sreevihar	Assistant Professor, Department of Zoology, Malabar Christian College, Calicut.
10	Dr. Suresh V	Assistant Professor, Department of Botany, Govt. Victoria College, Palakkad
11	Dr. Sreenivasan E	Industrial Expert, Head R & D, The Western India Plywood Ltd.
Special Invitees		
12	Sneha C,	Assistant Professor, Department of Forestry, Sir Syed College, Taliparamba
13	Azhar Ali A	Assistant Professor, Department of Forestry, Sir Syed College, Taliparamba

FYUGP BSc FORESTRY ADHOC COMMITTEE

1	Prof. S Sudheesh (Chairperson)	Dean, Faculty of Science
2	Sneha C, (Convener)	Assistant Professor, Department of Forestry, Sir Syed College, Taliparamba
3	Aneesh K S	Assistant Professor, Department of Forest Resource Management, College of Forestry, Vellanikkara, KAU.
4	Malik Fasil M	Assistant Professor, Department of Wildlife Science, College of Forestry, Vellanikkara, KAU.
5	Azhar Ali A	Assistant Professor, Department of Forestry, Sir Syed College, Taliparamba
6	Dr. Ganesh Gopal T M	Assistant Professor, Department of Wood Science and Technology, Mangattuparamba Campus, Kannur University.
7	Dr. Manoj K	Assistant Professor, Department of Environmental Studies, Mangattuparamba Campus, Kannur University.
8	Dr. P Balakrishnan Peroth	Sr. Scientist, Department of Wildlife Biology, KFRI, Thrissur.
9	Dr.Amruth M	Sr. Scientist, Department of Sociology, KFRI, Thrissur.
10	Dr. Santhosh Sreevihar	Assistant Professor, Department of Zoology, Malabar Christian College, Calicut.
11	Dr. Suresh V	Assistant Professor, Department of Botany, Govt. Victoria College, Palakkad

KANNUR UNIVERSITY

UG PROGRAMME OUTCOMES (PO)

PO1	Critical Thinking
1.1	Acquire the ability to apply the basic tenets of logic and science to thoughts, actions, and interventions.
1.2	Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.
1.3	Develop self-critical abilities and also the ability to view positions, problems, and social issues from plural perspectives.
PO2	**Effective Citizenship**
2.1	Learn to participate in nation-building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy, and the values that guide a republic.
2.2	Develop and practice gender sensitive attitudes, environmental awareness, empathetic social awareness about various kinds of marginalization and the ability to understand and resist various kinds of discrimination.
2.3	Internalize certain highlights of the nation's and region's history. Especially of the freedom movement, the renaissance within native societies and the project of modernization of the postcolonial society.
PO3	**Effective Communication**
3.1	Acquire the ability to speak, write, read, and listen clearly in person and through electronic media in both English and in one Modern Indian Language
3.2	Learn to articulate, analyse, synthesise, and evaluate ideas and situations in a well-informed manner.
3.3	Generate hypotheses and articulate assent or dissent by employing both reason and creative thinking.
PO4	**Interdisciplinarity**
4.1	Perceive knowledge as an organic, comprehensive, interrelated, and integrated faculty of the human mind
4.2	Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.
4.3	Develop aesthetic, social, humanistic, and artistic sensibilities for problem solving and evolving a comprehensive perspective

FYUGP IN FORESTRY

PROGRAMME SPECIFIC OUTCOMES (PSOS)

After successful completion of four-year UG programme in Forestry, a student should be able to:

PS0 1	Demonstrate a deep understanding of forest ecosystems, including the interactions between biotic and abiotic components, ecological succession, and the role of forests in global biogeochemical cycles.
PSO 2	Implement and manage sustainable forestry practices, ensuring the balance between economic, ecological, and social values in forest resource utilization and conservation.
PS0 3	Utilize advanced tools and technologies such as Geographic Information Systems (GIS), remote sensing, and drone technology for forest inventory, mapping, monitoring, and management.
PSO 4	Plan and execute wildlife management and habitat conservation strategies, ensuring the protection and restoration of biodiversity within forest ecosystems.
PS0 5	Engage in participatory approaches to forestry that involve local communities, fostering collaboration and integrating traditional knowledge with scientific practices for sustainable forest management.
PSO 6	Effectively communicate forestry-related issues to diverse audiences, advocating for sustainable forestry practices and raising awareness about the importance of forests in addressing environmental and societal challenges.
PS0 7	Promote a sense of environmental stewardship, fostering a positive vision for utilizing forests to combat global challenges, including climate change.

BSc FORESTRY (MAJOR) PATHWAY COURSES

Sl. No.	Level	Course Code	Sem	Name of the course	Credit	ESE	CE	PRACT	TOTAL
1st YEAR BSc FORESTRY									
I SEMESTER									
1	100-199	KU1DSCFOR101	1	Forest and Forest Ecology	3 +1	50	25	25	100
II SEMESTER									
2	100-199	KU2DSCFOR105	2	Principles and Practices of Silviculture	3+ 1	50	25	25	100
2nd YEAR BSc FORESTRY									
III SEMESTER									
3	200-299	KU3DSCFOR201	3	Tree Physiology	3 + 1	50	25	25	100
4	200-299	KU3DSCFOR202	3	Wood Structure and Functions	4	70	30	0	100
IV SEMESTER									
5	200-299	KU4DSCFOR206	4	Forest Utilization	3 + 1	50	25	25	100
6	200-299	KU4DSCFOR207	4	Wildlife Management and Conservation Biology	3 + 1	50	25	25	100
7	200-299	KU4DSCFOR208	4	Forest Genetics and Biotechnology	3+ 1	50	25	25	100
3rd YEAR BSc FORESTRY									
V SEMESTER									
Sl. No.	**Level**	**Course Code**	**Sem**	**Name of the course**	**credit**	**ESE**	**CE**	**PRACT**	**TOTAL**
8	300-399	KU5DSCFOR301	5	Soil Science	3+ 1	50	25	25	100
9	300-399	KU5DSCFOR302	5	Forest Health and Protection	3+ 1	50	25	25	100
10	300-399	KU5DSCFOR303	5	Agroforestry, Social Forestry and Human Dimension	4	70	30	0	100
11	300-399	KU5DSEFOR304	5	*Wildlife Monitoring Techniques*	4	70	30	0	100

12		KU5DSEFOR305	5	*Vegetation Analysis and Biodiversity Assessment*	4	70	30	0	100
13	300-399	KU5DSEFOR306	5	*Forest Mensuration*	4	70	30	0	100
14	300-399	KU5DSEFOR307	5	*Forest Tree Breeding*	4	70	30	0	100
VI SEMESTER									
15	300-399	KU6DSCFOR309	6	Seed Technology	3 + 1	50	25	25	100
16	300-399	KU6DSCFOR310	6	Forest Economics and Elementary Statistics	3+ 1	50	25	25	100
17	300-399	KU6DSCFOR311	6	Forest Management and Plantation Forestry	4	70	30	0	100
18	300-399	KU6DSEFOR312	6	*Wood Defects, Degradation and Preservation*	4	70	30	0	100
19	300-399	KU6DSEFOR313	6	*Certification of Forest Products*	4	70	30	0	100
20	300-399	KU6DSEFOR314	6	*Silviculture of Indian Trees*	4	70	30	0	100
21		KU6DSEFOR315	6	*Forest Survey and Geoinformatics*	4	70	30	0	100
22	300-399	KU6INTFOR317	6	Internship/apprenticeship/ FFE / Nature Camp	2	35	15	0	50
4th YEAR BSc FORESTRY									
VII SEMESTER									
Sl. No.	**Level**	**Course Code**	**Sem**	**Name of the course**	**credit**	**ESE**	**CE**	**PRACT**	**TOTAL**
23	400-499	KU7DCCFOR401	7	Microbiology for Forestry	3+ 1	50	25	25	100
24	400-499	KU7DCCFOR402	7	Forest Hydrology and Watershed Management	4	70	30	0	100
25	400-499	KU7DCCFOR403	7	Wood based Industries	4	70	30	0	100
26	400-499	KU7DCCFOR404	7	Environmental Impact Assessment and Auditing	4	70	30	0	100
27	400-499	KU7DCCFOR405	7	Forest Stand Dynamics	4	70	30	0	100

VIII SEMESTER									
28	400-499	KU8DCCFOR406	8	Tree Breeding and Advanced Propagation Techniques	3+ 1	50	25	25	100
29	400-499	KU8DCCFOR407	8	Environmental legislation and Management	3+ 1	50	25	25	100
30	400-499	KU8DCCFOR408	8	Climate Change and Disaster Management	3+ 1	50	25	25	100
31	400-499	KU8DCEFOR409	8	*Advanced Bioinformatics*	3+ 1	50	25	25	100
32	400-499	KU8DCEFOR410	8	*Ecological modelling*	3+ 1	50	25	25	100
33	400-499	KU8DCEFOR411	8	*R programming*	3+ 1	50	25	25	100
34	400-499	KU8DCEFOR412	8	*Biostatistics*	3+ 1	50	25	25	100
35	400-499	KU8DCEFOR413	8	*Research Methodology*	3+ 1	50	25	25	100
36	400-499	KU8DCEFOR414	8	*Scientific Writing*	3+ 1	50	25	25	100
37	400-499	KU8DCEFOR415	8	*Global Change Ecology*	3+ 1	50	25	25	100
38	400-499	KU8DCEFOR416	8	*Wood variation*	3+ 1	50	25	25	100
39	400-499	KU8DCEFOR417	8	*Biometrical Genetics*	3+ 1	50	25	25	100
40	PROJECT	KU8PRJFOR426	8	Project	8	140	60	--	200
41	PROJECT	KU8PRJFOR427	8	Project	12	210	90	--	300

BSc FORESTRY (MINOR) PATHWAY COURSES

Sl. No.	Level	Course Code	Sem	Name of the course	credit	ESE	CE	PRACT	TOTAL
I SEMESTER									
42	100-199	KU1DSCFOR102	1	Introduction to Forest Resources	3 + 1	50	25	25	100
43	100-199	KU1DSCFOR103	1	Introduction to Wildlife Sciences	3 + 1	50	25	25	100
II SEMESTER									
44	100-199	KU2DSCFOR105	2	Forest Botany	3 + 1	50	25	25	100
45	100-199	KU2DSCFOR106	2	Field Ornithology and Bird Watching	3 + 1	50	25	25	100
III SEMESTER									
46	200-299	KU3DSCFOR203	3	Introduction to Agroforestry	3 + 1	50	25	25	100
47	200-299	KU3DSCFOR204	3	Wildlife Management	3 + 1	50	25	25	100
VIII SEMESTER									
48	300-399	KU8DSEFOR418	8	*Ethnobiology and Intellectual Property Rights*	3+ 1	50	25	25	100
49	300-399	KU8DSEFOR419	8	*Entrepreneurial Forestry*	3+ 1	50	25	25	100
50	300-399	KU8DSEFOR420	8	*Green technology and Sustainable Development*	3+ 1	50	25	25	100
51	300-399	KU8DSEFOR421	8	*Remote Sensing and GIS*	3+ 1	50	25	25	100
52	300-399	KU8DSEFOR422	8	*Medicinal and Aromatic Plants*	3+ 1	50	25	25	100
53	300-399	KU8DSEFOR423	8	*Zoonotic Disease Management*	3+ 1	50	25	25	100
54	300-399	KU8DSEFOR424	8	*Biochemistry*	3+ 1	50	25	25	100
55	300-399	KU8DSEFOR425	8	*Instrumentation and Biological Techniques*	3+ 1	50	25	25	100

VALUE ADDITION AND SKILL ENHANCEMENT COURSES

Sl. No.	Course Code	Name of the course	credit	ESE	CE	PRACT	TOTAL
VAC							
56	KU3VACFOR220	Basic Life Support Skills and First Aid	3				
57	KU3VACFOR221	Field Etiquettes in Forestry	3				
58	KU4VACFOR222	Civic Education	3				
59	KU4VACFOR223	Towards Environmental Stewardship	3				
60	KU4VACFOR224	Citizen Science in Conservation	3				
61	KU4VACFOR225	Bioethics and IPR	3				
SEC							
62	KU4SECFOR230	Dendrology	3				
63	KU4SECFOR231	Ornithology	3				
64	KU4SECFOR232	Herpetology	3				
65	KU4SECFOR233	Forest Biometry	3				
66	KU5SECFOR330	Introduction to IT	3				
67	KU5SECFOR331	Indoor Plantscaping	3				
68	KU5SECFOR332	Urban Greenscaping	3				
69	KU5SECFOR333	Commercial Bee Keeping	3				
70	KU6SECFOR334	Drone Application in Natural Resource Management	3				
71	KU6SECFOR335	Conservation photography	3				
72	KU6SECFOR336	IOT in Plant Nursery Automation	3				
73	KU6SECFOR337	Woodworking and Finishing Techniques	3				

SYLLABUS INDEX

Name of the Major: **Forestry**

SEMESTER I								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU1DSCFOR101	Forest and Forest Ecology	DSC A	4	5	3		2	
KU1DSCFOR102	Introduction to Forest Resources	DSC B	4	5	3		2	
KU1DSCFOR103	Introduction to Wildlife Sciences	DSC C	4	5	3		2	
KU1MDCFOR104	Ecotourism	MDC 1	3	4	3		0	
		AEC 1 (E)	3	3	3		0	
		AEC 2 (L)	3	3	3		0	
SEMESTER II								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU2DSCFOR105	Principles and Practices of Silviculture	DSC A	4	5	3		2	
KU2DSCFOR106	Forest Botany	DSC B	4	5	3		2	
KU2DSCFOR107	Field Ornithology and Bird Watching	DSC C	4	5	3		2	

KU2MDCFOR108	Wildlife Photography	MDC 2	3	3	3		0	
		AEC 1 (E)	3	3	3		0	
		AEC 2 (L)	3	3	3		0	
SEMESTER III								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU3DSCFOR201	Tree Physiology	DSC A	4	5	3		2	
KU3DSCFOR202	Wood Structure and Functions	DSC A	4	4	4		0	
KU3DSCFOR203	Introduction to Agroforestry	DSC B	4	5	3		2	
KU3DSCFOR204	Wildlife Management	DSC C	4	5	3		2	
KU3VACFOR220	Basic Life Support Skills and First Aid	VAC *(Anyone)*	3	3	3		0	
KU3VACFOR221	Field Etiquettes in Forestry							
	MDC 3 in Kerala-specific content shall be offered by language disciplines only	MDC 3	3	3	3		0	
SEMESTER IV								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU4DSCFOR206	Forest Utilization	DSC A	4	5	3		2	
KU4DSCFOR207	Wildlife Management and Conservation Biology	DSC A	4	5	3		2	

KU4DSCFOR208	Forest Genetics and Biotechnology	DSC A	4	5	3		2	
KU4VACFOR222	Civic Education	VAC *(Any one)*	3	3	3		0	
KU4VACFOR223	Towards Environmental Stewardship							
KU4VACFOR224	Citizen Science in Conservation	VAC *(Any one)*	3	3	3		0	
KU4VACFOR225	Bioethics and IPR							
KU4SECFOR230	Dendrology	SEC *(Any one)*	3	3	3		0	
KU4SECFOR231	Ornithology							
KU4SECFOR232	Herpetology							
KU4SECFOR233	Forest Biometry							
SEMESTER V								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU5DSCFOR301	Soil Science	DSC A	4	5	3		2	
KU5DSCFOR302	Forest Health and Protection	DSC A	4	5	3		2	
KU5DSCFOR303	Agroforestry, Social Forestry and Human dimension	DSC A	4	4	4			
KU5DSEFOR304	*Wildlife Monitoring Techniques*	DSE 1	4	4	4			
KU5DSEFOR305	*Vegetation Analysis and Biodiversity Assessment*		4	4	4			
KU5DSEFOR306	*Forest Mensuration*	DSE 2	4	4	4			
KU5DSEFOR307	*Forest Tree Breeding*		4	4	4			
KU5SECFOR330	Introduction to IT	SEC						

KU5SECFOR331	Indoor Plantscaping	*(Any one)*	3	3	3			
KU5SECFOR332	Urban Greenscaping							
KU5SECFOR333	Commercial Bee Keeping							
SEMESTER VI								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU6DSCFOR309	Seed Technology	DSC A	4	5	3		2	
KU6DSCFOR310	Forest Economics and Elementary Statistics	DSC A	4	5	3		2	
KU6DSCFOR311	Forest Management and Plantation Forestry	DSC A	4	4	4		0	
KU6DSEFOR312	*Wood Defects, Degradation and Preservation*	DSE 3	4	4	4		0	
KU6DSEFOR313	*Certification of Forest Products*		4	4	4		0	
KU6DSEFOR314	*Silviculture of Indian Trees*	DSE 4	4	4	4		0	
KU6DSEFOR315	*Forest Survey and Geoinformatics*		4	4	4		0	
KU6SECFOR334	Drone Application in Natural Resource Management	SEC *(Any one)*	3	3	3		0	
KU6SECFOR335	Conservation photography							
KU6SECFOR336	IOT in Plant Nursery Automation							
KU6SECFOR337	Woodworking and Finishing Techniques							
KU6INTFOR317	Intern/apprentice/FFE /Nature Camp		2				2	

SEMESTER VII								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU7DCCFOR401	Microbiology for Forestry	DCC	4	5	3		2	
KU7DCCFOR402	Forest Hydrology and Watershed Management	DCC	4	4	4		0	
KU7DCCFOR403	Wood based Industries	DCC	4	4	4		0	
KU7DCCFOR404	Environmental Impact Assessment and Auditing	DCC	4	4	4		0	
KU7DCCFOR405	Forest Stand Dynamics	DCC	4	4	4		0	
SEMESTER VIII								
Course Code	**Title of the Course**	**Type of the Course DSC, MDC, SEC etc.**	**Credit**	**Hours /week**	**Hour Distribution**			
					L	**T**	**P**	**O**
KU8DCCFOR406	Tree Breeding and Advanced Propagation Techniques	DCC	4	5	3		2	
KU8DCCFOR407	Environmental legislation and Management	DCC	4	5	3		2	
KU8DCCFOR408	Climate Change and Disaster Management	DCC	4	5	3		2	
KU8DCEFOR409	*Advanced Bioinformatics*	DCE	4	5	3		2	
KU8DCEFOR410	*Ecological modelling*		4	5	3		2	

KU8DCEFOR411	*R programming*		4	5	3		2	
KU8DCEFOR412	*Biostatistics*	DCE	4	5	3		2	
KU8DCEFOR413	*Research Methodology*		4	5	3		2	
KU8DCEFOR414	*Scientific Writing*		4	5	3		2	
KU8DCEFOR415	*Global Change Ecology*	DCE	4	5	3		2	
KU8DCEFOR416	*Wood variation*		4	5	3		2	
KU8DCEFOR417	*Biometrical Genetics*		4	5	3		2	
KU8DSEFOR418	*Ethnobiology and Intellectual Property Rights*	DSE *(For Minor Pathway)*	4	5	3		2	
KU8DSEFOR419	*Entrepreneurial Forestry*		4	5	3		2	
KU8DSEFOR420	*Green Technology and Sustainable Development*	DSE *(For Minor Pathway)*	4	5	3		2	
KU8DSEFOR421	*Remote Sensing and GIS*		4	5	3		2	
KU8DSEFOR422	*Medicinal and Aromatic Plants*	DSE *(For Minor Pathway)*	4	5	3		2	
KU8DSEFOR423	*Zoonotic Disease Management*		4	5	3		2	
KU8DSEFOR424	*Biochemistry*	DSE *(For Minor Pathway)*	4	5	3		2	
KU8DSEFOR425	*Instrumentation and Biological Techniques*		4	5	3		2	

KU8PRJFOR426	*PROJECT*	8 Credit						
KU8PRJFOR427		12 Credit						

DSC - Discipline Specific Pathway components (Major/Minor); DSE - Discipline Specific Pathway components (Elective); DCC - Discipline Specific Capstone Components; DCE - Discipline Specific Capstone Components (Elective); AEC - Ability Enhancement courses; SEC - Skill Enhancement Courses; VAC - Value Addition Courses; MDC - Multi-disciplinary Courses.

Course Distribution for Students in the Fourth Year of KUFYUGP

(i) Three PG level core courses (level 400 & above) in the Major discipline (for Honours); or (ii) Combination of Major core courses of level 400 & project up to 12 credits in the

Major discipline (for Honours); or (iii) One 12-credit Research Project in the Major discipline (for Honours with Research) (iv) In the case of Honours students who go to another institution for doing the Project, the remaining Major core course can be in the online mode or in the in-person mode from the institution where the Project is being done. ***AND***

(i) Three Minor Pathway Courses of level 300 & above / level 400 & above; or (ii) Three Elective Courses in Major discipline of level 400 & above; or (iii) Two courses in Minor discipline + One course in Major / any other discipline; or (iv) Three Courses in any other discipline of level 300 & above / level 400 & above; or (v) Two courses in Major / Minor / any other discipline + One course in research methodology (vi) Two of these courses can be in the online mode. These online courses can be taken either in semester VII or in semester VIII, but their credits shall be added to the student's account only in semester VIII. (vii) For those students who go to another institution to do the Project, all three courses can be in the online mode or in the in-person mode from the institution where the Project is being done.

KU1DSCFOR101 FOREST AND FOREST ECOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC	100-199	KU1DSCFOR101	4	75

<table>
<tr><td colspan="3">Learning Approach (Hours/ Week)</td><td colspan="3">Marks Distribution- Theory</td><td rowspan="2">Duration of ESE (Hours)</td></tr>
<tr><td>Lecture</td><td>Practical/ Internship</td><td>Tutorial</td><td>CE</td><td>ESE</td><td>Total</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">1</td><td rowspan="3"></td><td>25</td><td>50</td><td>75</td><td rowspan="3">2</td></tr>
<tr><td colspan="3">Marks Distribution- Practical</td></tr>
<tr><td>10</td><td>15</td><td>25</td></tr>
</table>

Course Description: This course offers an in-depth exploration of forests, forestry, and ecological principles, focusing on biomes, forest types, and their management. Students will examine the characteristics of various biomes, with special emphasis on forest ecosystems. The course also delves into the historical and contemporary aspects of forestry, particularly in India and Kerala, and covers ecological principles and succession theories relevant to forest management. Through theoretical learning and practical exercises, students will gain a comprehensive understanding of forest ecology, biodiversity, and sustainable management practices.

Course Prerequisite

- Basic knowledge in Ecology at 10th level, Ability to write examinations in English.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Explain the various definitions and classifications of forests based on regeneration methods, age, composition, management objectives, growing stock, ownership, and legal status.	***U***
2	Apply classification systems, such as Champion & Seth's revised classification, to identify forest types in India and Kerala.	***A***
3	Analyze the structure and function of forest ecosystems, including energy flow, nutrient cycling, and succession processes.	***An***

4	Assess the impact of global climate change on forests and the role of forests in carbon sequestration and climate change mitigation.	***E***
5	Develop sustainable forest management and conservation strategies that consider both local and global contexts.	©

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create ©

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔			✔			
CO 2			✔				
CO 3	✔					✔	
CO 4							✔
CO 5		✔			✔		✔

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**
1	**MODULE TITLE: INTRODUCTION TO WORLD FORESTS (10 Hours)**	
	1	Biomes of the world- Biotic and abiotic characteristics
		a) Tundra
		b) Temperate Coniferous Forests
		c) Deciduous Forests

		d) Tropical Rain Forests
		e) Grasslands
		f) Deserts
		g) Water biomes
	2	Temperate and Tropical Forests- Comparison
	3	Forest: various definitions
	4	Classification of forests based on
		a) Method of regeneration
		b) Age
		c) Composition
		d) Objects of management
		e) Growing stock
		f) Ownership
		g) Legal status
2	**MODULE TITLE: FORESTRY AND STATE OF FOREST (15 Hours)**	
	1	Definition, History, and Development of Indian Forestry
	2	Branches of Forestry and their relationships
	3	Forest types in India and Kerala: systems of classification
	4	State of the forests: global, Indian, and Kerala scenario
	5	Distribution, species composition, and characteristic features of forests with special reference to Kerala
		a) Evergreen forests
		b) Deciduous forests

		c) Shola forests
		d) Mangroves
		e) Myristica swamp forests
3	**MODULE TITLE: BASICS OF ECOLOGY (10 Hours)**	
	1	Levels of biological organization – abiotic and biotic components and their interaction.
	2	Trophic levels, food chains, ecological pyramids and energy flow.
	3	Forest Ecology – Forest ecosystem, structure and dynamics.
	4	Horizontal and vertical stratification.
	5	Formation of forest communities
		a) Consociation
		b) Association
4	**MODULE TITLE: Ecological Succession (10 Hours)**	
	1	Succession Types
		a) Primary and Secondary Succession
		b) Autogenic and Allogenic Succession
		c) Xerarch and Hydrarch
	2	Causes of succession
	3	Forest succession and climax vegetation types
	4	Succession theories
		a) Monoclimax
		b) Polyclimax

		c) Mosaic theory
	5	Models of succession
5	**Teacher Specific Module (30 Hours)**	
	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.	
	5.1 Visit a local biome (e.g., a forest, grassland, or wetland) to observe and document biotic and abiotic factors. 5.2 Collect soil, water, and plant samples from different biomes for laboratory analysis of physical and chemical properties. 5.3 Use microscopes to examine soil microorganisms from different biomes. 5.4 Collect data on temperature, humidity, soil composition, and biodiversity from both temperate and tropical forests. 5.5 Assess species composition in different forest types using quadrat sampling. Space to fill the selected area/ activity	

Essential Readings:

1. Archibold, O.W., 2012. *Ecology of world vegetation*. Springer Science & Business Media.
2. Terborgh, J., 1985. The vertical component of plant species diversity in temperate and tropical forests. *The American Naturalist*, *126*(6), pp.760-776.
3. Khanna, L.S.1989. Principles and Practice of Silviculture. KhannaBandhu, Dehra Dun. 473 p
4. Negi, S.S., 1994. *Indian forestry through the ages*. Indus Publishing.
5. Parthiban, K.T., Krishnakumar, N. and Karthick, M., 2018. *Introduction to Forestry & Agroforestry*. Scientific Publishers.
6. **https://fsi.nic.in/**
7. Sundarapandian, S.M. and Swamy, P.S., 2000. Forest ecosystem structure and composition along an altitudinal gradient in the Western Ghats, South India. *Journal of tropical forest Science*, pp.104-123.
8. Simonetta, A.M., 2009. LEVELS OF BIOTIC ORGANIZATION. *BIOLOGICAL SCIENCE FUNDAMENTALS AND SYSTEMATICS-Volume I*, p.107.
9. Mishra, R. Ecology Work Book. Oxford and IBH Publishing Co, Calcutta.
10. Lal J. B. Forest Ecology. Natraj Publishers, Dehra Dun
11. Luken, J.O., 1990. *Directing ecological succession*. Springer Science & Business Media.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	2
	3	3
	4	3
2	1	4
	2	3
	3	5
	4	6
	5	7
3	1	8
	2	9
	3	10
	4	10
	5	10
4	1	11
	2	11
	3	11
	4	11
	5	11

Suggested Readings:

- Odum, E.P. 1983. Basic Ecology. Saunders College Publishing, Holt Saunders, Japan
- Odum, E.P. Fundamentals of Ecology. Natraj Publisher, Dehradun
- Misra KC. Manual of Plant Ecology. Oxford & IBH Pub Co. New Delhi etc. 491p
- Michael P. Ecological Methods for Field and Laboratory Investigations. Tata McGraw-Hill Pub.Co. New Delhi, 404p
- Frankel, O.H., Brown, A.H.D., Burdon, J.J. 1995. The Conservation of Plant Biodiversity. Cambridge University Press. Cambridge. 299p
- Negi, S.S. 1993. Biodiversity and its Conservation in India. India Publishing company, New Delhi
- Saggwal, S.S. 1995. Forest Ecology of India. Pioneer Publishers, India. 368p

Assessment Rubrics:

Evaluation Type – Theory		Marks
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical		Marks
End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4
b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample Questions to Test Outcome

2 Mark Questions

1. Compare and contrast the abiotic factors of tundra and tropical rain forests.
2. Explain the main differences between temperate and tropical forests in terms of biodiversity and climate.

3. Apply Champion & Seth's classification to identify and describe the main forest types in Kerala.
4. Describe the characteristic features and species composition of Myristica swamp forests in Kerala.

3 Mark Questions

1. Analyze the structure and dynamics of a temperate forest ecosystem.
2. Explain the difference between consociation and association in the formation of forest communities.
3. Identify and discuss the primary causes of ecological succession in forests.
4. Compare and contrast monoclimax and polyclimax theories of succession.

5 Mark Questions

1. Develop a sustainable forest management strategy for a deciduous forest in India, considering both local and global contexts.
2. Assess the impact of global climate change on tropical rain forests and their role in carbon sequestration.

Employability for the Course:

- Environmental Educator
- Conservation Scientist
- Environmental Consultant
- Ecologist

KU1DSCFOR102 INTRODUCTION TO FOREST RESOURCES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU2DSCFOR102	4	75

<table>
<tr><td colspan="3">Learning Approach (Hours/ Week)</td><td colspan="3">Marks Distribution- Theory</td><td rowspan="2">Duration of ESE (Hours)</td></tr>
<tr><td>Lecture</td><td>Practical/ Internship</td><td>Tutorial</td><td>CE</td><td>ESE</td><td>Total</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">1</td><td rowspan="3"></td><td>25</td><td>50</td><td>75</td><td rowspan="3">2</td></tr>
<tr><td colspan="3">Marks Distribution- Practical</td></tr>
<tr><td>10</td><td>15</td><td>25</td></tr>
</table>

Course Description: Introduction to Forest Resources is a foundation course offering an in-depth examination of the ecological, social, and economic significance of forest ecosystems. Students will explore the multifaceted roles of forests in biodiversity conservation, climate regulation, and sustainable development while also addressing the myriad threats they face, including deforestation and habitat degradation. Through interdisciplinary study, students will learn about the principles and practices of sustainable forest management, conservation strategies, and the integration of indigenous knowledge systems. Emphasizing a holistic approach, the course will equip students with the knowledge and skills necessary to contribute to the preservation and responsible stewardship of forest resources on a global scale.

Course Prerequisite:

Basic knowledge in Biology at 10th level, Ability to write examinations in English.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Identify the key characteristics and distribution patterns of different forests	***R***
2	Apply knowledge of forest biomes to analyze and predict the distribution of specific species.	***A***
3	Analyze the interconnectedness of these ecological services and their importance for ecosystem health.	***An***
4	Evaluate the adaptive strategies of flora and fauna in evergreen and deciduous forests.	***E***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔		✔	✔			
CO 2	✔			✔			

CO 3	✔	✔					✔
CO 4	✔			✔		✔	

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION
1	**MODULE TITLE: GENERAL INTRODUCTION TO WORLD FORESTS (15 Hours)**	
	1	World forests
		a) Distribution
		b) Classification
		c) Characteristics
	2	Temperate and Tropical Forests- Comparison
	3	Evergreen and Deciduous Forest
		a) Distribution
		b) species composition
		c) characteristic features
	4	State of the forests
		a) World
		b) India
		c) Kerala

2	**MODULE TITLE: ROLE OF FORESTS (5 Hours)**	
	1	Direct benefits from forests
		a) Contribution to the economy
		b) Ecotourism
	2	Indirect benefits from forests
		a) Biodiversity conservation
		b) Carbon sequestration
		c) Watershed protection
		d) Soil conservation
		e) Climate regulation
	3	Social and cultural values of forest
3	**MODULE TITLE: Threats to Forest Health (10 Hours)**	
	1	Deforestation and forest degradation
	2	Climate change- impacts on forests
	3	Other threats (invasive species, diseases)
4	**MODULE TITLE: Conservation Strategies of Forest resources (15 Hours)**	
	1	Legal Frameworks and Policies
	2	Conservation Strategies: National Perspectives
	3	Forest Organization
5	**Teacher Specific Module (30 Hours)**	
	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.	

	5.1 Forest Biome Observation 5.2 Forest Health Assessment 5.3 Carbon Sequestration Experiment Space to fill the selected area/ activity

Essential Readings:

1. Perry, D.A., Oren, R. and Hart, S.C., 2008. *Forest ecosystems*. JHU press.
2. Terborgh, J., 1985. The vertical component of plant species diversity in temperate and tropical forests. *The American Naturalist*, *126*(6), pp.760-776.
3. Bahuguna, V.K., Swaminath, M.H., Tripathi, S., Singh, T.P., Rawate, V.R.S. and Rawatf, R.S., 2016. Revisiting forest types of India. *International Forestry Review*, *18*(2), pp.135-145.
4. https://fsi.nic.in/forest-report-2021
5. Sills, E.O. and Abt, K.L. eds., 2003. *Forests in a market economy* (Vol. 72). Springer Science & Business Media.
6. Kettunen, M. and ten Brink, P. eds., 2013. *Social and economic benefits of protected areas: an assessment guide*. Routledge.
7. Hosonuma, N., Herold, M., De Sy, V., De Fries, R.S., Brockhaus, M., Verchot, L., Angelsen, A. and Romijn, E., 2012. An assessment of deforestation and forest degradation drivers in developing countries. *Environmental research letters*, *7*(4), p.044009.
8. Ciesta, W.M., 1998. Climate Change Forests and Forest Management: An Overview.
9. Simberloff, D., 2013. *Invasive species: what everyone needs to know*. Oxford University Press.
10. Tainter, F.H. and Baker, F.A., 1996. *Principles of forest pathology*. John Wiley & Sons.
11. Varghese, M.I., 2022. Treatise on Forest Laws in Kerala. Swamy Law House.
12. Babu, M.U. and Nautiyal, S., 2015. Conservation and management of forest resources in India: ancient and current perspectives. *Natural Resources*, *6*(4), pp.256-272.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	2
	3	3

	4	4
2	1	5
	2	6
	3	6
3	1	7
	2	8
	3	9,10
4	1	11
	2	12

Suggested Readings:

- Grebner, D.L., Bettinger, P., Siry, J.P. and Boston, K., 2021. *Introduction to forestry and natural resources*. Academic press.
- Sahana, M., Areendran, G., Raj, K., Sivadas, A., Abhijitha, C.S. and Ranjan, K., 2022. Introduction to Forest Resources in India: Conservation, Management and Monitoring Perspectives. In *Conservation, Management and Monitoring of Forest Resources in India* (pp. 3-31). Cham: Springer International Publishing.
- Banerjee, A., Jhariya, M.K., Yadav, D.K. and Raj, A. eds., 2020. *Environmental and sustainable development through forestry and other resources*. CRC press.
- Shit, P.K., Pourghasemi, H.R., Das, P. and Bhunia, G.S., 2020. *Spatial Modeling in Forest Resources Management*. Springer.
- Shit, P.K., Pourghasemi, H.R., Adhikary, P.P., Bhunia, G.S. and Sati, V.P. eds., 2021. *Forest resources resilience and conflicts*. Elsevier.
- Singh, M.P., Singh, J.K. and Mohanka, R., 2007. *Forest environment and biodiversity*. Daya Books.

Assessment Rubrics:

Evaluation Type – Theory		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10

c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical		**Marks**
End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4
b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample questions to Test Outcome

2 Mark Questions

1. What are the primary characteristics of tropical, temperate, and boreal forests?
2. Given a specific forest biome, predict the type of flora and fauna you would expect to find there and explain why.
3. Describe the differences in species diversity between tropical and temperate forests.
4. How does altitude affect the distribution and characteristics of forests?

3 Mark Questions

1. Discuss how biodiversity conservation in forests contributes to overall ecosystem health.
2. Analyze the relationship between soil conservation provided by forests and agricultural productivity in surrounding areas.
3. How does the availability of sunlight and water affect the distribution of species within a forest biome?

5 Mark Questions

1. Discuss how biodiversity conservation in forests contributes to overall ecosystem health.
2. Explain the role of forests in carbon sequestration and its impact on climate regulation.

3. Describe how watershed protection by forests benefits both the forest ecosystem and human populations.

Employability for the Course:

- Wildlife Biologist/Ornithologist
- Environmental Educator/Interpretive Guide
- Conservation Officer/Environmental Consultant
- Ecotourism Guide
- Research Technician/Field Assistant
- Citizen Science Coordinator

KU1DSCFOR103 INTRODUCTION TO WILDLIFE SCIENCES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCFOR103	4	75

<table>
<tr><td colspan="3">Learning Approach (Hours/ Week)</td><td colspan="3">Marks Distribution- Theory</td><td rowspan="2">Duration of ESE (Hours)</td></tr>
<tr><td>Lecture</td><td>Practical/ Internship</td><td>Tutorial</td><td>CE</td><td>ESE</td><td>Total</td></tr>
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<tr><td colspan="3">Marks Distribution- Practical</td></tr>
<tr><td>10</td><td>15</td><td>25</td></tr>
</table>

Course Description: This course introduces the fundamental principles of wildlife science, including the study of wildlife ecology, conservation biology, and management practices. It covers the behaviour, population dynamics, and habitat requirements of various wildlife species, as well as the human dimensions of wildlife conservation.

Course Prerequisite: Basic knowledge of biology at the 10^{th} level.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains

1	Define and explain key concepts in wildlife science, including ecology, behaviour, and conservation.	***R***
2	Describe the ecological roles and habitat requirements of various wildlife species.	***U***
3	Analyze the factors affecting wildlife populations and their dynamics.	***An***
4	Understand and apply the principles of wildlife management and conservation strategies.	***A***
5	Evaluate human impacts on wildlife and develop strategies to mitigate these effects.	***E***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔			✔			
CO 2	✔			✔			
CO 3	✔			✔		✔	
CO 4	✔	✔				✔	✔
CO 5	✔	✔			✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**
1	**MODULE TITLE: Fundamentals of Wildlife Science (15 Hours)**	
	1	Wildlife Science
		a) Definitions and values of wildlife

		b) Characteristics of wildlife in different biomes and zoogeographic regions of the world
	2	Behaviour of Wild animals
		a) Instinctive behaviour, learned behaviour, dispersal behaviour, social behaviour, and reproductive behaviour
		b) Clutch size and litter size and age of maturity
		c) Territory, Home range and significance of territory
	3	Adaptations of wild animals
		a) Aestivation, hibernation, torpor and diapause
		b) Predator avoidance – camouflage, mimicry and schooling
2	**MODULE TITLE: Mammalogy and Indian mammals (15 Hours)**	
	1	Characteristics of class mammalia
	2	Classification of mammals and the detailed account on mammalian orders of Indian sub-continent:
		a) Primates, Carnivora, Proboscidea, Perissodactyla
		b) Rodentia, Chiroptera, Lagomorpha
	3	Zoogeography of Indian mammals
3	**MODULE TITLE: Herpetology (10 Hours)**	
	1	Breeding biology of reptiles and amphibians
	2	Role of temperature in sex determination in reptiles
	3	Identification of venomous and nonvenomous snakes
	4	Snake bites, Venom, Anti-venom, First Aid and Management of snake bite cases.
4	**MODULE TITLE: Conservation Strategies (5 Hours)**	
	1	Conservation Principles

		a) In-situ and ex-situ conservation
		b) Endangered species and Endemic species
	2	Conservation projects in India
		a) Project Tiger
		b) Project Lion
		c) Project Elephant
		d) Project crocodile
	3	Causes of Extinction
5	**Teacher Specific Module**	
	Prepare based on the current trends in wildlife science. Include human animal interactions and its implications	

Essential Readings:

1. Dasmann, R.F. 1982. Wildlife Biology. Wiley Pub. New York.
2. Gee EP. 2000. The wildlife of India. Harper Collins Publication.
3. Johnsingh AJT. (Ed.). 2003. The Mammals of South Asia: Ecology, Behaviour and Conservation. Permanent Black.
4. Prater, S.H. 1971. The Book of Indian Animals. Oxford University press, Bombay.
5. Daniel JC. 1980. Book of Indian reptiles. OUP
6. Whitaker R and Ashok Captain. 2004. Snakes of India: The Field Guide. Draco Books, Chennai.
7. Primack, R.B. 1993. Essentials of Conservation Biology. Soiner, MA.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	1

	3	2
2	1	3
	2	3
	3	4
3	1	5
	2	5
	3	6
	4	6
4	1	7
	2	7
	3	7

Suggested Readings:

- Vivek Menon. 2003. Field Guide to Indian Mammals. Penguin Books, India.
- Whitaker R and Ashok Captain. 2004. Snakes of India: The Field Guide. Draco Books, Chennai.
- Kumar and Asija. Biodiversity – Principles and conservation. UpdeshPurohit, Agrobios, Jodhpur
- Negi, S.S. 1993. Biodiversity and its Conservation in India. India Publishing company, New Delhi

Assessment Rubrics:

Evaluation Type – Theory		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3

d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical		**Marks**
End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4
b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample questions to Test Outcome

2 Mark Questions

1. Differentiate between instinctive behaviour and learned behaviour in wild animals with examples.
2. What are the primary ecological roles of apex predators in an ecosystem?
3. Describe the term 'biodiversity' and explain why it is crucial for ecosystem stability.

3 Mark Questions

1. Discuss the symbiotic relationships found in coral reef ecosystems and their significance for marine life.
2. Explain the concept of carrying capacity and its relevance to wildlife management.
3. Describe the principles of in-situ conservation and provide examples of its application.
4. Analyze the impact of urbanization on local wildlife populations and their habitats.
5. Discuss the importance of community involvement in wildlife conservation efforts.
6. Explain how population viability analysis (PVA) is used in wildlife management.

5 Mark Questions

1. Analyze the effects of climate change on migration patterns and reproductive cycles of wildlife.
2. Develop a comprehensive plan to mitigate the impact of climate change on a specific wildlife species.

KU1MDCFOR104 ECOTOURISM

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	MDC	100-199	KU1MDCFOR104	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0		25	50	75	1.5

Course Description: This course provides an in-depth exploration of ecotourism, focusing on its principles, objectives, and impact. Students will learn about the historical context of tourism, different forms and categories, and the classification and dimensions of tourism. Special emphasis will be placed on the principles of ecotourism, its potential in India, stakeholder roles, environmental and social impacts, and sustainable development practices.

Course Prerequisite:

- Ability to write examinations in English

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Recall the definition and historical evolution of tourism and ecotourism.	***R***
2	Discuss the potential of ecotourism in India and the role of various stakeholders.	***U***
3	Apply zoning and carrying capacity concepts to plan ecotourism in protected areas.	***A***
4	Analyze the environmental and social impacts of ecotourism on local communities and ecosystems.	***An***

5	Design an ecotourism project plan, including marketing and business strategies	***C***
6	Evaluate the effectiveness of ecotourism initiatives in contributing to sustainable development	***E***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔						
CO 2		✔		✔			
CO 3							✔
CO 4		✔					✔
CO 5		✔				✔	
CO 6			✔		✔		

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**
1	**MODULE TITLE: Introduction to Tourism (5 Hours)**	
	1	Tourism-Definition and History
		a) a) Definition of tourism
		b) Historical development of tourism
	2	Forms and Categories of Tourism
		a) Classification of tourism: domestic, international, inbound, and outbound

		b) Different forms: adventure, cultural, sustainable, and ecotourism
	3	Dimensions and Basic Components of Tourism
		a) Key components: attractions, accessibility, amenities, and ancillary services
2	**MODULE TITLE: Fundamentals of Ecotourism (10 Hours)**	
	1	Ecotourism-Definition and Elements
		a) Defining ecotourism
		b) Core elements of ecotourism
	2	Principles and Objectives of Ecotourism
	3	Potential of Ecotourism in India
		a) Key ecotourism sites in India
		b) Forms of Ecotourism: Hard and Soft Ecotourism
3	**MODULE TITLE: Impacts of Ecotourism (10 Hours)**	
	1	Roles of various stakeholders
	2	Organizations and NGOs Promoting Ecotourism
	3	Impacts on the Environment
		a) Positive and negative environmental impacts
	4	Social Impacts
		a) Community involvement and cultural impacts
4	**MODULE TITLE: Ecotourism and Sustainable Development (10 Hours)**	
	1	Planning Ecotourism in Protected Areas
		a) Carrying capacity and zoning
		b) Ecotourism in important protected areas of India-

	2	Business Plan and Marketing
		a) Marketing strategies and green consumerism
		b) Developing a business plan
	3	Economic Valuation of Ecotourism Sites
		a) Travel cost method
	4	World Ecotourism Summit
5	**Teacher Specific Module (10 Hours)**	
	Directions: Prepare a visitor satisfaction survey for different ecotourism sites in Kannur	

Essential Readings:

1. Chiranjeev, A. 2008.Concept of tourism.JnanadaPrakashan.
2. Hosetti, B.B. 2007.Ecotourism development and management, Pointer publishers, Jaipur
3. Chiranjeev, A. 2008.Ecotourism planning and Development.JnanadaPrakashan.
4. Aaradhana, S. 2009. Indian tourism, Wildlife tourism and Ecotourism.JnanadaPrakashan. 288 p
5. Honey, M. 2008. Ecotourism and Sustainable development.Island Press.
6. Chiranjeev, A. 2008. Ecological, Social and Cultural aspects of Ecotourism.JnanadaPrakashan.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	1
	3	2
2	1	3
	2	3
	3	3
3	1	4
	2	4

	3	4
	4	4
4	1	5
	2	5
	3	6
	4	6

Suggested Readings:

1. Thampi, Santosh P. Ecotourism in Kerala, India: Lessons from the eco-development project in Periyar Tiger Reserve. Vol. 13. ECOCLUB, 2005.
2. Pujar, Sachin C., and Niharranjan Mishra. "Ecotourism industry in India: a review of current practices and prospects." Anatolia 32.2 (2021): 289-302.
3. Singh, Gurinder, Vikas Garg, and Shalini Srivastav. "Ecotourism in India: social trends and pathways on sustainable tourism and eco-travelling." International Journal of Business and Globalisation 28.4 (2021): 468-480.
4. Das, Suchismita. "Ecotourism, sustainable development and the Indian state." Economic and Political Weekly 46.37 (2011): 60-67.
5. Das, Madhumita, and Bani Chatterjee. "Ecotourism: A panacea or a predicament?." Tourism management perspectives 14 (2015): 3-16.

Assessment Rubrics:

Evaluation Type		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Sample questions to Test Outcome

2 Mark Questions

1. Define tourism and explain its primary components.
2. Trace the historical development of tourism from ancient times to the modern era.
3. What is ecotourism, and how does it differ from traditional forms of tourism?
4. Discuss the historical milestones in the development of ecotourism.

3 Mark Questions

1. Identify and describe key ecotourism sites in India.
2. Discuss the different forms of ecotourism practiced in India, highlighting examples of hard and soft ecotourism.
3. Analyze the roles of government agencies, NGOs, and local communities in promoting ecotourism in India.
4. What are the objectives of ecotourism, and how do they align with sustainable development goals in India?
5. Explain the impact of ecotourism on local economies and biodiversity conservation in India.

5 Mark Questions

1. Discuss the concept of zoning in ecotourism planning and provide examples of its application in protected areas.
2. Analyze the challenges and benefits of implementing carrying capacity limits in popular ecotourism destinations.
3. Develop a zoning plan for an ecotourism site, considering environmental, social, and economic factors.

KU2DSCFOR105 PRINCIPLES AND PRACTICE OF SILVICULTURE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCFOR105	4	75

<table>
<tr><td colspan="3">Learning Approach (Hours/ Week)</td><td colspan="3">Marks Distribution- Theory</td><td rowspan="2">Duration of ESE (Hours)</td></tr>
<tr><td>Lecture</td><td>Practical/ Internship</td><td>Tutorial</td><td>CE</td><td>ESE</td><td>Total</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2"></td><td>25</td><td>50</td><td>75</td><td rowspan="2">2</td></tr>
<tr><td colspan="3">Marks Distribution- Practical</td></tr>
</table>

			10	15	25	

Course Description: The course "Principles and Practices of Silviculture" provides a comprehensive understanding of forestry principles, focusing on ecological processes, sustainable resource management, and biodiversity conservation. Students explore fundamental concepts such as the definitions of forests, forestry, and silviculture, alongside the objectives and scope of silviculture and its interrelation with other branches of forestry. Through the application of knowledge on silvicultural systems, students analyze forest management practices, assess site suitability for regeneration based on principles of tree growth and development, and engage in field techniques such as forest inventory and monitoring. Emphasizing sustainable forestry practices, the course fosters environmental stewardship and equips students to contribute to the advancement of forestry knowledge and practices, addressing global challenges including climate change.

Course Prerequisite:

Basic knowledge in Biology at 10th level, Ability to write examinations in English.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Recall fundamental concepts of silviculture, including definitions of forests, forestry, and silviculture.	***R***
2	Explain the objectives and scope of silviculture and its relationship with other branches of forestry.	***U***
3	Apply knowledge of silvicultural systems to classify and analyze forest management practices.	***A***
4	Utilize principles of tree growth and development to assess site suitability for regeneration.	***A***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7

CO 1	✔						
CO 2	✔				✔		
CO 3		✔	✔			✔	
CO 4		✔		✔		✔	

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**MODULE TITLE: INTRODUCTION TO SILVICULTURE (10 Hours)**		
	1	Silviculture	2
		a) Objectives	
		b) Scope	
	2	Relation with Other Branches of Forestry	1
	3	Silvics and Site Factors	3
		a) Climatic Factors	
		b) Edaphic Factors	
		c) Physiographic Factors	
		d) Biotic Factors	
		e) Interactions among Site Factors	
	4	TREE GROWTH AND DEVELOPMENT	4
		a) Trees and Their Distinguishing Features	

		b) Growth and Development of Trees	

2	**MODULE TITLE: SILVICULTURAL SYSTEMS (15 Hours)**		
	1	Definition, Scope, and Classification of Silvicultural Systems	3
	2	Systems of Concentrated Regeneration	3
		a) Clear Felling Systems	
		b) Shelterwood System	
	3	Systems of Diffused Regeneration	3
		a) Selection System and Its Modifications	
	4	Accessory Systems	6
		a) Coppice Systems	
		b) Culm Selection System in Bamboo	
		c) Canopy Lifting System in Andaman	

3	**MODULE TITLE: REGENERATION OF FORESTS (15 Hours)**		
	1	Objectives and Ecology of Regeneration	3
	2	Natural Regeneration Processes	5
		a) Seed Production	
		b) Seed Dispersal	
		c) Germination and Establishment	
		d) Requirements for Natural Regeneration	
		e) Advance Growth	

		f) Coppice and Root Sucker Regeneration	
		g) Regeneration Survey	
		h) Natural Regeneration Supplemented by Artificial Regeneration	
	3	Artificial Regeneration	7
		a) Objectives and Advantages of Artificial Regeneration	
		b) Factors Governing the Choice of Regeneration Techniques	
4	**MODULE TITLE: TREE PLANTING AND CULTURAL OPERATIONS (5 Hours)**		
	1	Tree Planting Techniques	3
		a) Sowing vs. Planting	
		b) Different Kinds of Pits	
	2	Tending and Cultural Operations	2
		a) Weeding (Kinds of Weeding)	
		b) Release Operations	
		c) Singling and Cleaning	
		d) Liberation Cutting	
5	**Teacher Specific Module (30 Hours)**		**5**
	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.		
	5.1 Visit a local forest or plantation to observe different silvicultural practices. 5.2 Set up a small weather station to collect data on temperature, precipitation, humidity, and wind speed over a period of time. 5.3 Identify and classify different silvicultural systems (clear felling, shelterwood, selection) in a local forest or through case studies.		5

	5.4 Visit a site where clear felling is practiced. Study the regeneration process and document the species regenerating naturally. 5.5 Compare sites with natural regeneration and those with artificial regeneration techniques (e.g., planting, seeding). Evaluate the success and challenges of each method. Space to fill the selected area/ activity	

Essential Readings:

1. Günter, S., 2011. Introduction to silviculture in the tropics. In *Silviculture in the tropics* (pp. 3-10). Berlin, Heidelberg: Springer Berlin Heidelberg.
2. Khanna, L.S.1989. Principles and Practice of Silviculture. Khanna Bandhu, 7 Tilak Marg, Dehra Dun
3. Kozlowski, T.T., 1971. Growth and development of trees. Volume I: Seed germination, ontogeny and shoot growth. *Growth and development of trees. Volume I: Seed germination, ontogeny and shoot growth.*
4. Matthews, J.D., 1991. *Silvicultural systems*. Oxford University Press.
5. Duryea, M.L. and Dougherty, P.M., 1991. *Forest regeneration manual* (Vol. 36). Springer Science & Business Media.
6. Toumey, J.W. and Korstian, C.F., 1942. Seeding and planting in the practice of forestry. *Seeding and planting in the practice of forestry.*, (3rd ed.).
7. Evans, Julian, and John W Turnbull, 'Plantation maintenance', Plantation Forestry in the Tropics: The Role, Silviculture, and Use of Planted Forests for Industrial, Social, Environmental, and Agroforestry Purposes (Oxford, 2004; online edn, Oxford Academic, 31 Oct. 2023),

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	2
	3	2
	4	3
2	1	4
	2	4

	3	4
	4	4
	5	4
3	1	5
	2	5
	3	5
4	1	6
	2	7
	3	7

Suggested Readings:

- Nyland, R. D. (2016). Silviculture: Concepts and Applications, Third Edition. Waveland Press, 680 pages
- Ram Parkash (1991). Theory and Practice of Silvicultural Systems International Books & Periodicals, Dehra Dun, 298 pages
- Smith, D.M. (1986). Practice of Silviculture, Edn 8. New York, John Wiley.

Evaluation Type – Theory		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical	**Marks**

End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4
b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample questions to Test Outcome

2 Mark Questions

1. Define silviculture and explain how it differs from general forestry.
2. Give general and ecological definitions of forest
3. Explain the term 'forestry' and describe its main components.
4. Discuss the primary objectives of silviculture.
5. How does silviculture contribute to sustainable forest management?

3 Mark Questions

1. Describe the scope of silviculture in modern forestry practices.
2. Explain the relationship between silviculture and forest ecology.
3. How does silviculture integrate with forest economics and policy?
4. Discuss the role of silviculture in forest conservation and biodiversity management.

5 Mark Questions

1. Define silvicultural systems and explain their importance in forest management.
2. Compare and contrast the clear felling system and the shelterwood system.
3. Explain the selection system of diffused regeneration and its advantages.
4. What are the key characteristics of the coppice system, and where is it commonly used?
5. Analyze the culm selection system in bamboo and discuss its benefits for sustainable management.

Employability for the Course:

- Forest managers
- Silviculturists
- Ecological restoration specialists
- Forest ecologists
- Wildlife biologists

- Environmental planners.

KU2DSCFOR106 FOREST BOTANY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCFOR106	4	75

Learning Approach (Hours/ Week)			Marks Distribution- Theory			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	1		25	50	75	2
			Marks Distribution- Practical			
			10	15	25	

Course Description: This course offers a comprehensive study of plant taxonomy, focusing on the classification, identification, and nomenclature of plants. Students will learn about the morphological characteristics, evolutionary relationships, and ecological significance of plants. Fieldwork and laboratory sessions will provide hands-on experience in identifying and classifying plants.

Course Prerequisite:

- Basic understanding of botany or plant science

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Recall and define basic concepts and terminology related to plant taxonomy, such as taxonomic hierarchy, species, and botanical nomenclature.	***R***
2	Demonstrate understanding by explaining the principles of plant classification and the significance of morphological characteristics in identifying plant species.	***U***
3	Apply their knowledge to identify plant species using taxonomic keys and field guides during field trips and laboratory exercises.	***A***

4	Create herbarium specimens and comprehensive documentation for plant species they have identified, integrating morphological data.	***C***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔						
CO 2	✔			✔			
CO 3			✔	✔			
CO 4				✔		✔	

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**
1	**MODULE TITLE: INTRODUCTION TO PLANT BIOLOGY (10 Hours)**	
	1	External plant morphology- Vegetative characters
		a) Root types and functions
		b) Stems – functions and branching pattern
		c) Leaves – Parts, Form and Phyllotaxy
	2	External plant morphology- Reproductive characters
		a) Flowers - Unisexual and bisexual, symmetry
		b) Fruits – Simple, Aggregate and Multiple

		c) Seeds – Monocot and dicot
	3	Classification of Plant Life Forms
		a) Herbs
		b) Shrubs
		c) Trees
		d) Other forms
2	**MODULE TITLE: INTRODUCTION TO PLANT TAXONOMY (15 Hours)**	
	1	Definition and significance of taxonomy
	2	History and development of plant taxonomy
	3	Principles of classification
	4	Nomenclature and binomial system
3	**MODULE TITLE: PLANT IDENTIFICATION TECHNIQUES (15 Hours)**	
	1	Morphological characteristics of plants
	2	Reproductive characteristics of plants
		a) Salient features and Parts of the Flower- Bract, Calyx, Corolla, Androecium, Gynoecium
		b) Floral arrangement- types
		c) Relative position, cohesion, adhesion, Symmetry of flower
		d) Aestivation
		e) Placentation- types
		f) Inflorescence: Racemose, Cymose, Special type and Mixed types
	3	Use of dichotomous keys

	4	Herbarium techniques
	5	Modern tools in plant identification
4	**MODULE TITLE: ECONOMIC BOTANY (5 Hours)**	
	1	Economic importance of common trees
		a) Timber
		b) NTFP
	2	Phytogeography
		a) Factors affecting plant distribution
		b) Phytogeographic zones of India
5	**Teacher Specific Module (30 Hours)**	
	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives, and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.	
	5.1 Conduct a Field trip to collect plant specimens 5.2 Use of dichotomous keys for plant identification 5.3 Techniques for pressing, drying, and mounting plant specimens 5.4 Labelling and cataloguing herbarium sheets 5.6 Preparation of Plant identification charts 5.7 Collection and Identification of Non-Timber Forest Products in Kerala Space to fill the selected area/ activity	

Essential Readings:

1. Kaplan, D.R., 2001. The science of plant morphology: definition, history, and role in modern biology. *American journal of botany*, *88*(10), pp.1711-1741.
2. Waller, D.M., 1988. Plant morphology and reproduction. *Plant reproductive ecology: patterns and strategies*, pp.203-227.
3. Lawrence, G.H., 1955. *An introduction to plant taxonomy*. Central Book Depot.
4. Backlund, A. and Bremer, K., 1998. To be or not to be. Principles of classification and monotypic plant families. *Taxon*, *47*(2), pp.391-400.
5. Roseline, A., 2019. *Botanical nomenclature*. MJP Publisher.

6. Foster, A.S. and Gifford, E.M., 1959. Comparative morphology of vascular plants. *Comparative morphology of vascular plants.*
7. Waller, D.M., 1988. Plant morphology and reproduction. *Plant reproductive ecology: patterns and strategies*, pp.203-227.
8. Fisher, P.L., Houseal, A.K., Tuthill, D. and Shim, J., 2016. Lesson 6: Plant Identification and Dichotomous Keys.
9. Paul, P., Dhar, S., Chowdhury, M. and Das, D., 2020. *Herbarium technique: evolution from conventional to digitization*. Orange Books Publication.
10. Finger, A., Groß, J. and Zabel, J., 2022. Plant Identification in the 21st Century—What Possibilities Do Modern Identification Keys Offer for Biology Lessons. *Education Sciences*, *12*(12), p.849.
11. Seth, M.K., 2003. Trees and their economic importance. *The Botanical Review*, *69*(4), pp.321-376.
12. Croizat, L., 2013. *Manual of phytogeography: an account of plant-dispersal throughout the world*. Springer.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	2
	3	3
2	1	3
	2	3
	3	4
	4	5
3	1	6
	2	7
	3	8
	4	9
	5	10
4	1	11

	2	12

Suggested Readings:

- Sambamurthy, A. V. S. S. 2005. Taxonomy of Angiosperms. I.K International Pvt. Ltd. 892 p.
- Jeffrey, C. 1982. An Introduction to plant taxonomy. Allied publishers. 154p.
- Henry, A. N. and Chandrabose, M. 1980. An Aid to the International Code of Botanical Nomenclature. Today and Tomorrow printers and publishers. 100p.
- Johri, R. M and SnehLata. 2005. Taxonomy- 1 (Systematics and Morphology). Sonali Publications. 340 p
- Johri, R. M and SnehLata. 2005. Taxonomy- 2 (Polypetalae). Sonali Publications. 300 p
- Johri, R. M and SnehLata. 2005. Taxonomy- 3 (Gamopetalae). Sonali Publications. 190 p

Assessment Rubrics:

Evaluation Type – Theory		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical		**Marks**
End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4

b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample questions to Test Outcome

2 Mark Questions

1. Define plant taxonomy and explain its significance in the study of botany.
2. What is the taxonomic hierarchy, and how is it used to classify plants?
3. Explain the concept of species in botanical nomenclature.
4. Describe the binomial system of nomenclature and its importance in plant taxonomy.
5. What are the major taxonomic ranks in the hierarchical classification of plants?

3 Mark Questions

1. Discuss the history and development of plant taxonomy, highlighting key milestones.
2. Explain the principles of plant classification and their application in modern botany.
3. Describe the various types of root systems and their functions in plants.
4. What are the different branching patterns of stems, and how do they contribute to plant identification?
5. Explain the parts of a leaf and the different forms and phyllotaxy observed in plants.
6. Differentiate between unisexual and bisexual flowers, and explain the significance of floral symmetry.

5 Mark Questions

1. Explain the different types of placentation observed in plants.
2. Describe the various types of inflorescence (racemose, cymose, special, and mixed) and their significance in taxonomy.

Employability for the Course:

- Botanist
- Taxonomist
- Environmental Consultant

KU2DSCFOR107 FIELD ORNITHOLOGY AND BIRD WATCHING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCFOR107	4	75

Learning Approach (Hours/ Week)			Marks Distribution- Theory			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	1		25	50	75	2
			Marks Distribution- Practical			
			10	15	25	

Course Description: This course delves into the captivating world of avian species, offering insights into their biology, behaviours, and habitats. Through a blend of theoretical knowledge and practical field experiences, students will develop skills in bird identification, observation, and conservation, fostering a deep appreciation for the diverse avifauna around them.

Course Prerequisite:

- Basic knowledge in Biology

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Identify various bird species using visual and auditory cues.	***R***
2	Explain the anatomical features and physiological functions of birds.	***U***
3	Analyze bird behaviors and their ecological significance.	***A***
4	Differentiate between similar bird species by analyzing key physical and behavioral characteristics.	***E***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create ©***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1				✔			
CO 2	✔						
CO 3	✔		✔				

CO 4				✔			
CO 5						✔	

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION
1	**MODULE TITLE: INTRODUCTION TO ORNITHOLOGY (10 Hours)**	
	1	Ornithology
		h) Definition and scope
		i) Renowned ornithologists and their contribution.
	2	Evolution and classification of birds
	3	Importance of birds in ecosystems
2	**MODULE TITLE: BIRD IDENTIFICATION TECHNIQUES (15 Hours)**	
	1	Bird identification features
		c) Visual Identification
		d) Auditory identification
	2	Techniques for bird watching
		1. Principles of Bird Watching
		2. Bird Watching Equipment and Tools
		3. Techniques for Effective Bird Watching

3	**MODULE TITLE: HABITATS AND BEHAVIOR (15 Hours)**	
	1	Bird Habitats
		a) Types of Habitats
		b) Habitat Preferences
	2	Bird Activities
		a) Movement
		b) Feeding
		c) Nesting and breeding
		d) Flocking and roosting
	3	Migration in Birds
		a) Types
		b) Causes
		c) Significance
4	**MODULE TITLE: FIELD TECHNIQUES IN ORNITHOLOGY (5 Hours)**	
	1	Field Study Methods
		a) Survey Techniques: Conducting bird surveys and censuses.
		b) Banding and Tagging
	2	Data Collection and Analysis
	3	Citizen Science and Community Involvement
5	**Teacher Specific Module (30 Hours)**	

	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.
	5.1 Overview of binoculars, spotting scopes, and cameras. 5.2 Practice using field guides and bird identification apps. 5.3 Introduction to field notebooks and data recording techniques. 5.4 Guided bird watching session in a local area 5.5 Focus on identifying common local species. 5.6 Practice using field guides to confirm identifications. 5.7 Audio session for learning bird calls and songs. 5.8 Field trip to a diverse range of habitats (forests, wetlands, grasslands). 5.9 Habitat mapping and description exercises. 5.10 Recording species observed in different habitats. 5.11 Participation in a citizen science project such as eBird, the Christmas Bird Count, or a local bird survey. Space to fill the selected area/ activity

Essential Readings:

1. Morrison, M.L., Rodewald, A.D., Voelker, G., Colón, M.R. and Prather, J.F. eds., 2018. *Ornithology: foundation, analysis, and application*. JHU Press.
2. Mainwaring, M.C., 2017. Why birds matter: avian ecological function and ecosystem services. *The Condor: Ornithological Applications*, *119*(2), pp.354-355.
3. Dunne, P., 2012. *The Art of Bird Identification: A Straightforward Approach to Putting a Name to the Bird*. Stackpole Books.
4. Dunne, P., 2003. *Pete Dunne on bird watching: The how-to, where-to, and when-to of birding*. Houghton Mifflin Harcourt.
5. Fuller, R.J. ed., 2012. *Birds and habitat: relationships in changing landscapes*. Cambridge University Press.
6. Wallace GJ and HD Mahan. 20015. An introduction to ornithology. Mc Million Publishing Company, New York.
7. Collias, N.E. and Collias, E.C., 2014. *Nest building and bird behavior* (Vol. 857). Princeton University Press.
8. Newton, I., 2023. *The migration ecology of birds*. Elsevier.

9. Ali, S., 1979. Bird study in India: its history and its importance. *India International Centre Quarterly*, *6*(2), pp.127-139.
10. Shyamal, L., 2007. Opinion: Taking indian ornithology into the information age. *Indian Birds*, *3*(4), pp.122-137.
11. Chandler, M., See, L., Copas, K., Bonde, A.M., López, B.C., Danielsen, F., Legind, J.K., Masinde, S., Miller-Rushing, A.J., Newman, G. and Rosemartin, A., 2017. Contribution of citizen science towards international biodiversity monitoring. *Biological conservation*, *213*, pp.280-294.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	1
	3	2
2	1	3
	2	4
3	1	5
	2	6,7
	3	8
4	1	9
	2	10
	3	11

Suggested Readings:

1. Neelakantan,K.K.1984. "KeralathilePakshikal". Kerala Sahithya Academy, Thrissur. 584pp.
2. Grimmet, R. Inskipp T and Inskipp, I. 2000. Pocket Guide to the of Birds of Indian subcontinent.Christopher Helm series
3. Grimmet, R. Inskipp, T and Nameer, P.O. 2007. Birds of southern India, BNHS series.
4. Sashikumar C., Praveen J., Palot M. J. and Nameer P. O. 2012. Birds of Kerala – status and distribution. DC Books.

Assessment Rubrics:

Evaluation Type – Theory		Marks
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Evaluation Type – Practical		Marks
End Semester Evaluation		**15**
Continuous Evaluation		**10**
a)	Test Paper	4
b)	Practical Record and Submissions	4
c)	Viva-Voce	2
Total		**25**

Sample questions to Test Outcome

2 Mark Questions

1. Briefly explain the significance of Archaeopteryx in the evolution of birds.
2. Name two renowned ornithologists and describe one significant contribution from each.
3. List three key visual features used to identify birds.
4. What are the primary reasons birds migrate?

3 Mark Questions

1. Why are birds considered important indicators of environmental health?
2. How can bird calls and songs be used to identify species?

3. Describe three different types of habitats where birds are commonly found.

5 Mark Questions

1. What are the essential tools for bird watching, and why are they important?
2. Explain the significance of foraging behavior in birds.
3. What are the common methods used for conducting bird surveys?

Employability for the Course:

- Wildlife Biologist/Ornithologist
- Environmental Educator/Interpretive Guide
- Conservation Officer/Environmental Consultant
- Ecotourism Guide
- Research Technician/Field Assistant
- Citizen Science Coordinator

KU2MDCFOR108 WILDLIFE PHOTOGRAPHY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	MDC	100-199	KU1MDCFOR108	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0		25	50	75	1.5

Course Description: Wildlife Photography is a Skill Enhancement course aims in photography of wildlife and nature, and story-telling using visual tools. Through a blend of theoretical lectures, hands-on practical sessions, and immersive field trips, students learn the fundamentals of wildlife photography, mastering essential techniques such as composition, camera settings, and understanding animal behaviour. They explore the intricacies of capturing dynamic shots of birds, mammals, and macro subjects, guided by ethical principles and a deep appreciation for wildlife conservation.

Course Prerequisite: Nil

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Define and explain the principles of wildlife and nature photography, including camera settings, composition techniques, and ethical considerations.	***U***
2	Develop the knowledge and skills to capture well-exposed and composed photographs of wildlife and natural landscapes in various environmental conditions.	***A***
3	Analyze photographs to interpret wildlife behavior, habitat characteristics, and environmental relationships, identifying patterns and connections within the natural world.	***An***
4	Generate visually compelling narratives through photography that communicate stories, emotions, and concepts	***C***

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✔			✔			
CO 2			✔	✔			
CO 3	✔			✔		✔	
CO 4					✔		✔

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION
1	**MODULE TITLE: BASIC ELEMENTS OF WILDLIFE PHOTOGRAPHY (10 Hours)**	
	1	Photography and overview of wildlife photography as a genre
	2	Essential gear and equipment for wildlife photography
	3	Workings of different kinds of cameras and lenses
	4	Use of light and speed for different kinds of photographs
		a) Motion photography
		b) Camera settings and exposure for wildlife Photography
2	**MODULE TITLE: COMPOSING AN IMAGE (5 Hours)**	
	1	Basic rules for composing good wildlife and nature photography
	2	Ethical considerations in wildlife photography
	3	Using photography as an effective tool for conservation story telling
		a) Storytelling and Portfolio Development
	4	Photography in research and conservation
3	**MODULE TITLE: POST-PROCESSING AND IMAGE EDITING (10 Hours)**	
	1	Introduction to post-processing software for wildlife photography
	2	Adjustments for exposure: techniques for fine-tuning exposure and brightness
	3	Color: understanding color correction and white balance adjustments
		a) Enhancing Contrast

		b) Sharpening techniques
	4	Preserving authenticity and ethical considerations in post-processing.
4	**MODULE TITLE: ADVANCED FIELD TECHNIQUES AND SKILLS (10 Hours)**	
	1	Mastering manual settings for challenging conditions
		a) Techniques for capturing fast-moving subjects
		b) Low-light photography
	2	Using remote cameras and drones for unique perspectives
	3	Developing a narrative through a series of images
	4	Selecting and curating images for a cohesive wildlife photography portfolio
5	**Teacher Specific Module (10 Hours)**	
	Directions: This module is a list of suggested activities that helps to achieve the aim, objectives and outcome of the course; which will be determined by the concerned teacher. Assessment for this module is strictly internal.	
	5.1 Create a checklist of essential gear for a wildlife photography outing. Include different types of cameras, lenses, tripods, and accessories. 5.2 Compare and contrast two different types of cameras (e.g., DSLR vs. mirrorless) and lenses (e.g., telephoto vs. wide-angle) by taking sample photos of the same subject. 5.3 Take a series of photos demonstrating the use of natural light at different times of the day (morning, noon, evening) and discuss how the light quality affects the images. 5.4 Practice capturing fast-moving subjects, such as birds in flight or running animals, using different shutter speeds. Evaluate the sharpness and motion blur in your photos. 5.5 Take photographs applying the rule of thirds, leading lines, and framing. Create a presentation explaining how these techniques enhance composition. 5.6 Develop a short photo story (3-5 images) that highlights a conservation issue. Write captions that explain the significance of each image. 5.7 Partner with a local conservation group to photograph a conservation project. Prepare a short presentation on how your images contribute to the group's goals.	

Essential Readings:

1. John and Barbara Gerlach. 2012. Digital Wildlife Photography. Routledge.
2. Excell, L. S. (2011). Wildlife Photography: From snapshots to great shots. Peachpit Press.
3. Parmenter, T. (1982). Wildlife and Nature Photography, by Michael Freeman. Croom Helm. London, Oryx, 16(4).
4. Young, S. (2022). Wildlife Photography Fieldcraft. Pelagic Publishing Ltd.
5. Caruso, R. D., & Postel, G. C. (2002). Image editing with Adobe Photoshop 6.0. Radiographics, 22(4).
6. Mangelson, T. D. (2013). Images of Nature: The Photographs of Thomas D. Mangelson. Rizzoli International Publications.
7. Frost, J. (2018). Creating a Wildlife Photography Portfolio. Ammonite Press.

Reference Distribution:

Module	Unit	Reference No.
1	1	1
	2	1
	3	2
	4	2
2	1	3
	2	3
	3	4
	4	4
3	1	5
	2	5
	3	5
	4	5
4	1	6
	2	6
	3	7
	4	7

Suggested Readings:

- Prakel, D. (2007). Basics Photography 02: Lighting (Vol. 2). AVA Publishing.
- Smith, J. (2020). The Positive and Negative Effects of Photography on Wildlife.
- Banek, C., & Banek, G. (2013). Learning to Photograph-Volume 1: Camera, Equipment, and Basic Photographic Techniques. Rocky Nook, Inc.

Assessment Rubrics:

Evaluation Type		Marks
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper- 1	10
b)	Test Paper-2	10
c)	Assignment/ Seminar/ Book/ Article Review/ Field Report	3
d)	Viva-Voce	2
Total		**75**

Sample questions to Test Outcome

2 Mark Questions

1. How would you adjust your camera settings for photographing wildlife in a dense forest with low light?
2. What is an ethical consideration to keep in mind during post-processing?
3. Name two popular post-processing software programs and describe one key feature of each.

3 Mark Questions

1. What criteria should you consider when selecting images for a wildlife photography portfolio?
2. How can you develop a strong narrative through a series of wildlife photographs?
3. What are some techniques for successful low-light wildlife photography?
4. What is the best approach for tracking and capturing sharp images of fast-moving wildlife?

5. What is the purpose of sharpening in wildlife photography, and how should it be applied?

5 Mark Questions

1. Describe a scenario where using a drone could enhance wildlife photography.
2. Describe a technique for enhancing contrast in a wildlife photo without losing detail.
3. How can wildlife photography contribute to conservation efforts?