



List of Revised Courses

Department : Department of Forestry, Wildlife and Environmental Sciences

Program Name : B. Sc. (Forestry)

Academic Year : 2022-23

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	FOUCTT6	Fundamentals of Wildlife and Its Management
02.	FOUCTT8	Remote Sensing and GIS Application in Forestry
03.	FOUGTT19	World Forestry System and Climate Change Mitigation



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

Academic Year : 2022-23

School : Natural Resources

Department : Forestry, Wildlife and Environmental Sciences

Date and Time : December 23, 2021 - 11:30 AM

Venue : Smart Class 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 to design and discuss the B. Sc. (Forestry) 4 Years (8 semester) scheme and syllabi.

The following members were present in the meeting:

1. Prof. A.K. Singh (External Expert Member BoS, Dept. of Genetics and Plant Breeding, College of Agriculture, Pant Nagar)
2. Prof. S S Singh (Member BoS, Dept. Forestry, Wildlife and Environmental Sciences)
3. Dr. Dr. S.C. Tiwari (HOD, Associate Prof., Dept. Forestry, Wildlife and Environmental Sciences , Chairman, BOS)
4. Dr. K.K. Chandra (Member BoS, Associate Professor, Dept. Forestry, Wildlife and Environmental Sciences)
5. Dr. Gunjan Patil (Member, Assistant Professor, Dept. Forestry, Wildlife and Environmental Sciences)

Following points were discussed during the meeting

1. Revised LOCF ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program.
2. LOCF/ECS scheme is implemented in any of the program of B. Sc. (Forestry) Four Years (8 Semester) degree program.
3. The BoS has approved the CBCS Course curriculum and ordinance of B. Sc. (Forestry) Four Years (8 Semester) degree program with effect from academic session 2021-22.

विभागाध्यक्ष
Head

Department of Forestry, Wildlife and Environmental Science
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD



Scheme and Syllabus- UG

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

FOR

B.Sc. FORESTRY

(w.e.f. Academic session:2021-22)



“SCHOOL 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)

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Course Structure and Credit Distribution

B.Sc. Forestry (4 -Year / 8- Semester) LOCF based Program

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week	Marks
I	Core-01	FOUATT1	Principles and Practice of Silviculture	3	3	100
	Core-01 Practical	FOUALT1		2	3	100
	Core-02	FOUATT2	Fundamentals of Soil Science	3	3	100
	Core-02 Practical	FOUALT2		2	3	100
	Generic Elective (GE)-01	FOUATG1	Basic Mathematics	4	4	100
	Seminar/ Tutorial	FOUASS1		1	1	100
	Ability Enhancement Course (AEC-01)	FOUATA1	Drawn from the University Pool	2	...	100
	Skill Enhancement Course (SEC-01)	FOUATL1	Drawn From the University pool	2	..	100
	Extracurricular Activity-(ECA-01) *Additional Credit Course (Non-Mandatory)	FOUATS1	ECA-Extra-curricular activity (Field visit/ NSS/NCC/ Swachhata/ Plantation Activities)	2		100
	Physical Education	FOUATS2	Non Credit	----	2	100
TOTAL				19	19	1000
II	Core -03	FOUBTT3	Forest Mensuration	3	3	100
	Core -03 Practical	FOUBLT3		2	3	100
	Core -04	FOUBTT4	Cytogenetics and Plant Breeding	3	3	100

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	Core -04 Practical	FOUBLT4		2	3	100
	Generic Elective (GE)- 02	FOUBTG2	Forest Botany and Dendrology	3	3	100
	Generic Elective (GE)- 02 Practical	FOUBLG2		2	3	100
	Ability Enhancement Compulsory (AEC-02)	FOUBTA2	Drawn from the university pool	2	2	100
	Skill Enhancement Course(SEC- 02)	FOUBTL2	Drawn From the University pool	2	..	100
	Extracurricular Activity- (ECA-02) *Additional Credit Course (Non Mandatory)	FOUBTS3	ECA-Extracurricular activity(Field visit/ NSS/ Swachhta/ vocational Training/ Plantation activities)	2	..	100
	Physical Education	FOUBTS4	Non Credit	----	2	100
	TOTAL			19	22	900
Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week	Marks
III	Core -05	FOUCTT5	Forest Ecology and Biodiversity Conservation	3	3	100
	Core -05 Practical	FOUCLT5		2	3	100
	Core -06	FOUCTT6	Fundamentals of Wildlife and its Management	3	3	100
	Core -06 Practical	FOUCLT6		2	3	100
	Core -07	FOUCTT7	Forest Management	3	3	100
	Core -07 Practical	FOUCLT7		2	3	100
	Generic Elective- (GE)-03	FOUCTG3	Non Timber Forest Products and Ethnoforestry	3	3	100
	Generic Elective (GE- 3) Practical	FOUCLG3		2	3	100

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	Ability Enhancement Course (AEC-03)	FOUCTA3	Drawn From the University Pool	2	...	100
	Extracurricular Activity- (ECA-03) *Additional Credit Course (Non Mandatory)	FOUCTS5	ECA-Extracurricular activity (Field visit/ NSS/NCC/ <i>Swachhta</i> / Physical Education/ Plantation Activities)	2	..	100
	Total			22	24	900
IV	Core -08	FOUDTT8	Remote Sensing and GIS Application in Forestry	3	3	100
	Core -08 Practical	FOUDLT8		2	3	100
	Core -09	FOUDTT9	Wood Science and Technology	3	3	100
	Core -09 Practical	FOUDLT9		2	3	100
	Core -10	FOUDTT10	Forest Surveying and Engineering	3	3	100
	Core -10 Practical	FOUDLT10		2	3	100
	Generic Elective- (GE)-04	FOUDTG4	Sericulture	3	3	100
	Generic Elective Practical (GE)-04	FOUDLG4		2	3	100
	Ability Enhancement Course (AEC-04)	FOUDTA4	Drawn From the University pool	2	...	100
	TOTAL			22	24	900
V	Core -11	FOUETT11	Watershed and its Management	3	3	100
	Core -11 Practical	FOUFLT11		2	3	100
	Core -12	FOUETT12	Forest Biotechnology and Tree Improvement	3	3	100
	Core -12 Practical	FOUFLT12		2	3	100

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	Core -13	FOUETT13	Forest Tree Seed Technology	3	3	100
	Core -13 Practical	FOUFLT13		2	3	100
	Discipline Specific Elective DSE-1	FOUETD1	Meteorology and Crop Production	3	3	100
	Practical	FOUELD1		2	3	100
			Basic Concept of Horticultural and Landscaping			
	TOTAL			20	24	800
VI	Core -14	FOUFTT14	Forest Pathology and Entomology	3	3	100
	Core -14 Practical	FOUFLT14		2	3	100
	Core -15	FOUFTT15	Agroforestry and Tree Outside Forests	3	3	100
	Core -15 Practical	FOUFLT15		2	3	100
	Core -16	FOUFTT16	Forest Economics	3	3	100
	Core -16 Practical	FOUFLT16		2	3	100
	Discipline Specific Elective- (DSE-2)	FOUFTD2	Urban Forestry	3	3	100
	Practical	FOUFLD2		2	3	100
			Land Degradation and Restoration			
	Ability Enhancement Course (AEC-05)	FOUFTA5	Drawn from the University Pool	2	..	100
	MOOC Course (01)		Online MOOC Course	2
	TOTAL			24	24	900
VII	Core -17	FOUGTT17	Biostatistics	3	3	100
	Core -17 Practical	FOUGLT17		2	3	100

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	Core -18	FOUGTT18	Forest Policy, Legislation and Environmental Act	3	3	100
	Core -18 Practical	FOUGLT18		2	3	100
	Core -19	FOUGTT19	World Forestry Systems and Climate Change Mitigation	3	3	100
	Core -19 Practical	FOUGLT19		2	3	100
	Discipline Specific Elective- (DSE-3)	FOUGTD3	Forestry Extension	3	3	100
	Practical	FOUGLD3		2	3	100
			Entrepreneurship Development			
	Seminar	FOUGSS2	Seminar	2	2	100
	TOTAL			22	26	900
VIII	INTR -1	FOUHEF1	Socio- economic Survey-Village attachment (Report Writing, Presentation, Viva-Voce)			200
	INTR - 2	FOUHEF2	Forest operation Work Experience (Report Writing, Presentation, Viva-Voce)			200
	INTR - 3	FOUHEF3	Forest Institute and Industrial visit (Report Writing, Presentation, Viva-Voce)			200
	Dissertation	FOUHDF1	Report Evaluation, Presentation, Viva-Voce			100
	The nature of the course in VIII Semester is field based. Socio- economic survey will be performed by the students in an assigned village. For exposure of forest operational work students will be attached with State Forest Department. Institute/ industrial training will be accomplished by the students through visits of nearby forest based Industries / Institutions.					
	TOTAL			22 (6 credits for each Training and 4 credits for Dissertation segment)	48 Hours/ week for each Training segment separately	700
	GRAND TOTAL			170		7000

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	Core -18	FOUGTT18	Forest Policy, Legislation and Environmental Act	3	3	100
	Core -18 Practical	FOUGLT18		2	3	100
	Core -19	FOUGTT19	World Forestry Systems and Climate Change Mitigation	3	3	100
	Core -19 Practical	FOUGLT19		2	3	100
	Discipline Specific Elective- (DSE-3)	FOUGTD3	Forestry Extension	3	3	100
	Practical	FOUGLD3		2	3	100
			Entrepreneurship Development			
	Seminar	FOUGSS2	Seminar	2	2	100
	TOTAL			22	26	900
VIII	INTR -1	FOUHEF1	Socio- economic Survey-Village attachment (Report Writing, Presentation, Viva-Voce)			200
	INTR - 2	FOUHEF2	Forest operation Work Experience (Report Writing, Presentation, Viva-Voce)			200
	INTR - 3	FOUHEF3	Forest Institute and Industrial visit (Report Writing, Presentation, Viva-Voce)			200
	Dissertation	FOUHDF1	Report Evaluation, Presentation, Viva-Voce			100
	The nature of the course in VIII Semester is field based. Socio- economic survey will be performed by the students in an assigned village. For exposure of forest operational work students will be attached with State Forest Department. Institute/ industrial training will be accomplished by the students through visits of nearby forest based Industries / Institutions.					
	TOTAL			22 (6 credits for each Training and 4 credits for Dissertation segment)	48 Hours/ week for each Training segment separately	700
	GRAND TOTAL			170		7000

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Scheme and Syllabus- UG

PAPER 3. FOREST BOTANY AND DENDROLOGY (GE-02) CR: 3 + 2

30% Introduction to Botany and Dendrology. Principles and systems of plant classification. Tailed study of Bentham and Hooker natural system, its advantages and disadvantages, plant nomenclature, principles and code of botanical nomenclature. Identification of woody forest flora. Morphology of different parts of typical flowering plant. Structure and types of plant tissues, internal structure of dicot, and monocot stems, root and a typical leaf. Significance of life cycles with special reference to alternation of generation in Nostoc, Rhizopus, Funaria, Adiantum, Pinus and in a flowering plant. Importance of plants in relation to environment. Water relation in plants. Absorption of water, ascents of sap. Stomata, structure, mechanism of opening and closing of stomata, guttation, transpiration, factors affecting transpiration.

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Photosynthesis, its importance and factors affecting it. Photorespiration. Mechanism of Respiration and factors affecting it. Phyto-hormones and their role in plant growth.

PRACTICAL

40% Morphological description of plant parts and methods of collection of plants techniques of preparing herbarium specimens. General study of herbarium. Morphological studies of root, stem, leaf and flowers. Dissection of flowers- making sketches- construction of floral diagram. Studies of permanent slides of histology and anatomy. General survey of the local vegetation. Forest taxonomy, A field trip during the semester. Osmosis- endo and exo-osmosis demonstration, Plasmolysis- demonstration, Transpiration rate, measuring the rate of photosynthesis in plant species.

Suggested Readings:

- Strasburger, Schenck, Noll, Fritz, Karsten and W.H. Lang (2010). A textbook of Botany. Academic Press, New York.
- V. Singh and D.K. Jain (2013) Biology. Nageen Prakashan Pvt Ltd, Meerut, India.
- L. Taiz, L., Zeiger, E., Ian M. Moller and Angus Murphy-Sixth ed. (2015). Plant Physiology and Development. Published by Sunderland: Sinauer Associates
- L. Taiz and E. Zeiger (2010). Plant Physiology. Sunderland: Sinauer Associates.
- V. Verma (2009) Textbook of Plant Physiology. Ane books Pvt. Ltd. New Delhi.
- S. R. Mishra (2011). Text Book of Dendrology. Discovery Books.



PAPER 2. FUNDAMENTALS OF WILDLIFE AND ITS MANAGEMENT

(Core-06)

CR: 3 + 2

40-1

Definition of wildlife, free living, captive, domesticated and feral animals, uses, values and negative impact of wildlife. Zoogeographic regions and biomes of the world. India's uniqueness in biodiversity, reasons and causes of wildlife depletion. Biogeographic classification of India. Status and distribution of wildlife in India. Scientific and common names of important mammals, birds and reptiles. Rare, endangered and threatened species of mammals, birds and reptiles of India. Agencies involved in wildlife conservation, Govt. and NGO's (BNHS, WWF, Indian Board for Wildlife, CITES). Biological basis of wildlife management. Basic requirements of wildlife – food, water, cover and space, limiting factors. Wildlife ecology: Relevance of basic ecological concepts such as food chain, food-web, ecological pyramids, habitat, ecological niche, carrying capacity, density, prey-predator relations and population dynamics, tourism and multiple use in protected areas. Wildlife damage control: Mitigating human – wildlife conflict: fences, trenches, walls, lure crops, repellents, translocation and compensation. Captive wildlife: Zoos and safari parks. Captive breeding for conservation. Central Zoo Authority of India. Wildlife census: Purpose, techniques. Wildlife (Protection) Act, 1972. Protected areas – Sanctuary, National Park and Biosphere Reserves. Special projects for wildlife conservation. Project Tiger and Musk Deer Project. Conservation: Meaning, principles and strategies, in-situ and ex-situ conservation, conserving biodiversity.

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PRACTICAL

Identification and study of wildlife in a nearby zoo. Bird watching. Observe and prepare the list of butterfly in the campus. Preparation of inventory of an area. Study of in-situ and ex-situ wildlife conservation activities. Case study.

Suggested Readings:

- Aaron, N.M. (1973). Wildlife ecology. W.H. Freeman Co. San Francisco, U.S.A.
- Anon, (1990). Collection and preservation of animals. Zoological Survey of India.
- Balakrishnan, M., (2016). Wildlife Ecology and Conservation, Scientific Publication.
- Dwivedi A P (2009). Managing wildlife of India. International Book Distributors, Dehradun, India.
- Karanth K. Ullas (2017), Wildlife Population, Nataraj Publications.
- Rajesh Gopal (1992). Fundamentals of wildlife management. Justice Home, Allahabad, India.
- Robert, A.W. (1979). The ecology and evolution of animal behavior. Good Year Pub. Co. California, U.S.A.
- Robert, G.H. (1978). Wildlife management. W.H. Freeman and Co., San Francisco, U.S.A.
- Singh S K (2009). Textbook of wildlife management. Today and Tomorrow publishers.



PAPER 3. WORLD FORESTRY SYSTEMS AND CLIMATE CHANGE
MITIGATION (Core-19) CR: 3 + 2

30/1
Geographical distribution of world forest and their classification. International and National Forestry Organizations. Critical examination of world forest resources, productivity potential and increment of world forests. Forest resources and Forestry practices in different regions of the world- North and South America, Europe, Africa. China, India, Russia, South East Asia and Australia. Forest development and economy of the world. Recent trends in Forestry development in the world. Climate change adaptation and mitigation. Mechanisms (CDM and REDD+), natural GHG effects, climate change: models, theories, facts and politics, Multilateral Agreements on Climate Change.

PRACTICAL

Plot the different biomes of the world map. Study about the different Bio-geographic regions of world & plot them on a map. Study and distribution of forest resources of South America, Africa, India and South East Asia. Plot the different hot spots of India on a map. Study of different hot spots of the world & plot it on a map. Case study on different multi-lateral agreements on climate change.

Suggested Readings:

- Champion and Seth (1968). Forest Types of India. Natraj publishers.
V.P. Agrawal (1985). Forestry in India. Oxford and IBH Publications, New Delhi
M.P Shrivastava (1997). Introductory to Forestry. Amazon Publishers.
S.S. Negi (1998). World Forest Systems. Natraj Publishers.
FAO (2020). Status report on world forestry, FAO, 2020



List of Revised Courses

Department : Department of Forestry, Wildlife and Environmental Sciences

Program Name : M. Sc. (Forestry and Environmental Sciences)

Academic Year : 2022-23

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	FOPCTJ3	Finance and Marketing Management of Forest Resources
02.	FOPCLJ4	Tree Business Management
03.	FOPCTR1	Breeding Methods in Forest Trees
	FOPCLR5	Forest Genetic Diversity Conservation and Environmental Impact



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

Academic Year : 2022-23

School : Natural Resources

Department : Forestry, Wildlife and Environmental Sciences

Date and Time : October 28, 2021 - 11:30 AM

Venue : Smart Class 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 to design and discuss the M. Sc. (Forestry and Environmental Sciences) scheme and syllabi.

The following members were present in the meeting:

1. Prof. A.K. Singh (External Expert Member BoS, Dept. of Genetics and Plant Breeding, College of Agriculture, Pant Nagar)
2. Prof. S S Singh (Member BoS, Dept. Forestry, Wildlife and Environmental Sciences)
3. Dr. Dr. S.C. Tiwari (HOD, Associate Prof., Dept. Forestry, Wildlife and Environmental Sciences , Chairman, BOS)
4. Dr. K.K. Chandra (Member BoS, Associate Professor, Dept. Forestry, Wildlife and Environmental Sciences)
5. Dr. Gunjan Patil (Member, Assistant Professor, Dept. Forestry, Wildlife and Environmental Sciences)

Following points were discussed during the meeting

1. Revised CBCS ordinance of M.Sc. Forestry & Environmental Sciences.
2. CBCS/ECS scheme is implemented in any of the program of M. Sc. (Forestry and Environmental Sciences).
3. The BoS has approved the CBCS Course curriculum and ordinance of M.Sc. Forestry & Environmental Sciences with effect from academic session 2021-22.

विभागाध्यक्ष
Head

वनिकी, 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



Scheme and Syllabus- PG

COURSE SYLLABUS FOR

M.Sc. FORESTRY & ENVIRONMENTAL SCIENCES

Choice Based Credit System (CBCS)
(w.e.f. Academic session:2021-22)



“SCHOOL OF NATURAL RESOURCES”

DEPARTMENT OF FORESTRY, WILDLIFE & ENVIRONMENTAL
SCIENCES

GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR-495009, CHHATTISGARH

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

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Course Structure
M.Sc. Forestry (2 -Year / 4- Semester) CBCS Program

Semester	Course Opted	Course Code	Name of the Course	Credit	Hour/ week	Marks
I st SEM	Core-01	FOPATT1	Silviculture	3	3	100
	Core-01 Practical	FOPALT1		1	3	100
	Core-02	FOPATT2	Forest Biometry, Surveying & Engineering	3	3	100
	Core-02 Practical	FOPALT2		1	3	100
	Core-03	FOPATT3	Forest Management, Remote Sensing & GIS	3	3	100
	Core-03 Practical	FOPALT3		1	3	100
	Core-04	FOPATT4	Forest Protection	3	3	100
	Core-04 Practical	FOPALT4		1	3	100
	Core-05	FOPATT5	Forest Ecology and Biodiversity Conservation	3	3	100
	Core-05 Practical	FOPALT5		1	3	100
	Core -06	FOPATT6	Forest Policy, Law and Environmental Legislation	3	3	100
	Core -06 Practical	FOPALT6		1	3	100
	TOTAL			24	36	1200

II nd SEM	Core -07	FOPBTT1	Forest Tree improvement and Biotechnology	3	3	100
	Core -07 Practical	FOPBLT1		1	3	100
	Core -08	FOPBTT2	Forest Industries and Wood Technology	3	3	100
	Core -08 Practical	FOPBLT2		1	3	100
	Core -09	FOPBTT3	Wildlife Biology and Conservation	3	3	100
	Core -09 Practical	FOPBLT3		1	3	100
	Core -10	FOPBTT4	Forest Soil and Watershed Management	3	3	100

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Core -10 Practical	FOPBLT4		1	3	100
Core -11	FOPBTT5	Global Environment and Climate Change	3	3	100
Core -11 Practical	FOPBLT5		1	3	100
RM -01	FOPBTM1	Forest Statistics and Research Methodology	3	3	100
RM-01 Practical	FOPBLM1		1	3	100
TOTAL			24	36	1200

IIIrd SEM Forest Management (FM)	Core -01	FOPCTJ1	Forest Resource Analysis	3	3	100
	Core-01 Practical	FOPCLJ1		1	3	100
	Core -02	FOPCTJ2	Production Management in Nursery and Plantation Forestry	3	3	100
	Core -02 Practical	FOPCLJ2		1	3	100
	Core -03	FOPCTJ3	Finance and Marketing Management of Forest Resources	3	3	100
	Core -03 Practical	FOPCLJ3		1	3	100
	Core -04	FOPCTJ4	Tree Business Management	3	3	100
	Core -04 Practical	FOPCLJ4		1	3	100
	Core -05	FOPCLJ5	Sustainable Forest Management in Changing World	3	3	100
	Core -05 Practical	FOPCLJ5		1	3	100
	OE-01	FOPCTO1	Urban Forestry	2	2	100
	Total			22	32	1100

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IV th SEM Forest Management (FM)					
Dissertation/Field work/ Internship/Project/Industry Visit/ Field Visit	FOPDDJ1	Field Training (Attachment with State Forest Department for understanding of Operations and Management / Practices currently used in Forest Management.	10	30	150
	FOPDEJ1	Forest Based Industrial Training	10	30	150
	FOPDPJ1	ICT Tools and Techniques Applications in Forestry.	03	09	50
	FOPDPJ2	Student Project Dissertations.	02	06	50
	Total		25	75	400
GRAND TOTAL			95	179	3900

III rd SEM Forest Genetic Resources (FGR)	Core -01	FOPCTR1	Breeding Methods in Forest Trees	3	3	100
	Core -01 Practical	FOPCLR1		1	3	100
	Core -02	FOPCTR2	Forest Tree Reproductive Biology and Seed Orchards	3	3	100
	Core -02 Practical	FOPCLR2		1	3	100
	Core -03	FOPCTR3	Molecular Genetics of Forest Trees	3	3	100
	Core -03 Practical	FOPCLR3		1	3	100
	Core -04	FOPCTR4	Quantitative Genetics of Forest Trees	3	3	100
	Core -04 Practical	FOPCLR4		1	3	100
	Core -05	FOPCLR5	Forest Genetic Diversity, Conservation and Environmental Impact	3	3	100
	Core -05 Practical	FOPCLR5		1	3	100

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OE-01	FOPCTO1	Urban Forestry	2	2	100
Total			22	32	1100

IV th SEM Forest Genetic Resources (FGR)					
Dissertation/Field work/Internship/ Project/Industry Visit/ Field Visit	FOPDDR1	Field Training (Attachment with State Forest Department for understanding of analysis of FGR, Forest Operations and Management of Forest Genetic Resources)	10	30	150
	FOPDER1	Forest Based Industrial Training	10	30	150
	FOPDPR1	ICT Tools and Techniques Applications in Forestry	03	09	50
	FOPDPR2	Student Projects Dissertations.	02	06	50
		Total	25	75	400
GRAND TOTAL			95	179	3900

Grand Total of Credits: 95

- The student project will be allotted in III Semester and will be evaluated at the end of IV Semester. Students will be given a topic for the project related to the curriculum by the supervisor allotted for the project.
- Visits:** Visits to forest operation sites, forest nursery, wildlife habitats and plantation sites will be conducted as per the requirement of the curriculum.

Signature

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PAPER III. FINANCE AND MARKETING MANAGEMENT OF FOREST RESOURCES

Changed
CR.4 (3+1) Syllabus
25%

Theory:

Finance and financial management: aims and objective with reference to forest based resources;
Sources of long term finance, Major Sources of funding and financing to the forest sector,

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Organization of finance in forest based industries

Concept of Working capital: Gross and net working capital, sources of working capital, factors influencing working capital of forest based industries.

Financial statements: importance and preparation, Balance sheet preparation of forest based industries with reference to profit and loss accounts.

Budget: Purpose and essentials of budgeting, important components of budget, preparation of budgets.

Challenges in Forest finance, Collaborative Partnership on Forests

Market- Classification, price determination. Demand and supply and factors affecting the market.

Marketing efficiency-measurement methods, Marketing cost, margin and price spread-concepts and applications types of market integration. Marketing and trading of wood and non-wood forest products. IPRs and their implications in forestry.

Practical

changed 90%

Working capital analysis of forest based industries. Balance sheet preparation of forest based product industries; field and local area visit and its classification under different types of market, Price determination of any forest products under the different market situation, Demand and supply elasticity measurements of forest produces, Measurement of marketing efficiency, Marketing and trade of national and international timber and non-timber forest products.

Suggested Readings

- Busby RJN. 1981. Investment Appraisal in Forestry. Forestry Commission Research Station, Surveys.
- FAO 1986. Guidelines to Project Evaluation. Natraj Publ.
- FAO, 1981. Tropical Forest Resources Assessment Project (In the Framework of Gems). Forest Resources of Tropical Africa. Part 1 & 2 Regional Synthesis.
- Grebner D. Betting P. Siry J., 2013 Introduction to forestry and Natural Resource. Elsevier Publisher.
- J.M. Kerr, 1997. Natural Resource Economics-Theory and Application in India, Oxford & IBH.
- Joshi, SS. and T.R. Kapoor., 2001. Fundamental of farm business Management. Kalyani Publishers
- Makchau JP & Malcolm LE. 1986. Economics of Tropical Farm Management. Cambridge Univ. Press.
- Nautiyal JC. 1988. Forest Economics, Principles and Applications; Natraj Publ.

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- Panda SC 2011. Farm management and Agricultural Marketing. Kalyani Publishers.
Shanley Alan R P. 2001 Tapping the green Market: Management and Certification of Non- Timber Forest Products. Amazon.
Sharma LC. 1980. Forest Economics -Principles and Applications; Natraj Publ.
W.A. Lauscher. Introduction to forest Resource Economics.
FAO.2019. Forest finance

PAPER IV. TREE BUSINESS MANAGEMENT

20% change in syllabus. CR.4 (3+1)

Theory

Tree farm: definition, concept, components and potential in uplifting the farmer's economy. Current farm scenario in India, constraints and the impact of climate change, Farm types and system of tree farming. Tree business management principles, Law of diminishing return, decision making, cost and price principle, Depreciation, Compounding, Planning and budgeting of tree and plantation. Labour efficiency measures, Management of tree based farms: technical and financial components of forest Nursery, plantations, sericulture, agroforestry, lac culture and other commercial plantations.

Practical

30% change in syllabus.

Visit of tree plantation, agriculture farm, agroforestry fields, Calculation of fertilizer and compost mixture for different plantations, Farm budgeting, Calculation of depreciation of farm machinery, calculation of cost of production, Preparation of farm record and ledger file. Farm tools and working principles, Visit of sericulture plantation and processing center.

Suggested reading:

- FAO 1986. Guideline to project evaluation. Natraj Publication, India.
Joshi SS and Kapoor TR. 2001. Fundamental of Farm Business Management, Kalyani Publication, India.
Ken JM, Morothia DK, Singh K, Ramashwamy C and Bentley WR. 1997. Natural Resource Economics: theory and application in India. Oxford and IBH publication.
Makchau JP and Malcolm LE. 1986. Economics of tropical farm management. Cambridge University Press.
Nautiyal JC. 1988. Forest Economics: Principle and application. Natraj Publisher, India
Panda SC. 2011. Farm Management and agricultural marketing. Kalyani Publishers.

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B. FOREST GENETIC RESOURCES

PAPER I. BREEDING METHODS IN FOREST TREES

Cr.4 (3+1)

Theory

10% Change in syllabus

Introduction to plant breeding, Genetic constitution of tree populations, half-sib, full-sib family in trees. Hardy-Weinberg equilibrium, changes in gene frequency through selection, migration, mutation and population sizes. Long-term and short-term breeding populations. Genetic variation and Heritability, Selective breeding methods- mass, family, within family, family plus within family. Grading system of plus trees in natural stands and plantations regression systems, mother tree selection, Selection for different traits. Clonal selection and hybridization. Genetic testing programs - mating designs, complete designs - nested designs, factorial, single pair mating, full diallel, half diallel and partial diallel, incomplete pedigree designs - open pollinated mating and polycross mating.

Experimental designs in genetic testing. Selection for disease resistance, mutation and polyploidy in plant breeding, Marker assisted selection. Breeding methods for wood quality, agroforestry, diseases and pest resistance, drought and salt resistance. Tree improvement case histories.

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Calculating gene and genotype frequencies. Flow chart for different breeding methods.

Practical

Half-sib, full-sib family in trees. Grading system of plus trees in natural stands. Mating designs, complete designs - nested designs, factorial, single pair mating, full diallel, half diallel and partial diallel, incomplete pedigree designs - open pollinated mating and polycross mating. Selection for biotic and abiotic stresses.

Suggested Readings

Breeding. ICAR.

FAO. 1985. *Forest Tree Improvement*, FAO Publ.

Faulkner R. 1975. *Seed Orchard Forestry* Commission Bull.No.34.

Fins L, Friedman ST & Brotschol JV.1992. *Handbook of Quantitative Forest Genetics*. Kluwer.

Khosla PK. 1981. *Advances in Forest Genetics*. Ambika Publ., New Delhi.

Mandal AK & Gibson GL(Eds.). 1997, *Forest Genetics and Tree Breeding*. CBS.

Namkoong, Gene, Kang, Hyun C., Brouard, Jeans S. *Tree Breeding: Principles and strategies*, Academic Press.

Steve Lee and John Woolliams. 2013. *Novel Tree Breeding*. Publinia@inia.es

Wright JW. 1976. *Introduction to Forest Genetics*, Academic Press.

Yanchuk, A.K. 2009. *Forest and forest plants- Vol. III. Techniques in forest tree breeding*.

Zobel BJ Talbert J. 1984. *Applied Forest Tree Improvement*. John Wiley & Sons.

Zobel BJ, Wyk GV & Stahl P. 1987. *Growing Exotic Forests*. John Wiley & Sons.



PAPER V: FOREST GENETIC DIVERSITY, CONSERVATION & ENVIRONMENTAL IMPACT Syllabus changed 40% CR 4(3+1)

Forest biodiversity: concept, levels Values, Services and threats. Levels of Genetic Variation in Forest Trees. Characteristics of Forest Genetic Diversity, Ecotypes, Subspecies, Population, Metapopulation, Provenance, Land race, Cline. Dynamics of forest genetic diversity: Genetic erosion, Population bottleneck, Genetic drift, Selection, Migration and Mutation and induced genetic diversity in forest tree species. Diversity of biogeographic zones of India. Hotspots of forest genetic diversity. Forest Genetic resource mapping biodiversity indices, methodology of biodiversity conservation, Evolutionary mechanism of FGR due to Environmental Change. Some important threatened/endemic/critically endangered plants of India, Intellectual property rights. The

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Biological Diversity Act, 2002, Quarantine laws and FGR exchange, International initiatives in Biodiversity Conservation

Practical

Visits and survey of forests biodiversity within their natural habitat. Measurement of forest biological diversity. FGR analysis of Natural stands in nearby forest area.

Suggested Readings

1. FAO. 1985. *Forest Tree Improvement*, FAO Publ.
- Faulkner R. 1975. *Seed Orchard* Forestry Commission Bull.No.34.
- Fins L, Friedman ST & Brotschol JV. 1992. *Handbook of Quantitative Forest Genetics*. Kluwer.
- Fred W. Allendorf, Gordon H. Luikart, Sally N. Aitken. 2012. *Conservation and the Genetics of Population*, 2nd Edition ISBN: 978-1- 118- 40857-5, Wiley E-Book.
- Khosla PK. 1981. *Advances in Forest Genetics*. Ambika Publ., New Delhi.
- Mahmut Caliskan. 2012. *Genetics Diversity in Plants*. In Tech Publishers.
- Mahmut Caliskan. 2012. *The Molecular Basis of Plants Genetics Diversity*. In Tech Publishers
- Mandal AK & Gibson GL. (Eds.). 1997. *Forest Genetics and Tree Breeding*. CBS.
- Padmini Sudarsana, Madhugiri Nageswara-Rao and Jaya R. Soneji. 2012. *Tropical Forest*. A free online edition of this book is available at www.intechopen.com
- Surendran C, Sehgal RN & Parmathama M. (Eds.). 2003. *A Text Book of Forest Tree Breeding*. ICAR.
- Wright JW. 1976. *Introduction to Forest Genetics*. Academic Press.
- Zobel BJ & Talbert J. 1984. *Applied Forest Tree Improvement*. John Wiley & Sons.
- Zobel BJ, Wyk GV & Stahl P. 1987. *Growing Exotic forests*. John Wiley & Sons.