# KUMAUN UNIVERSITY
# DEPARTMENT OF FORESTRY AND ENVIRONMENTAL SCIENCE

## M. Sc. FORESTRY SEMESTER CURRICULUM
## (AS PER UNIVERSITY GRANTS COMMISSION AND INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION)

| Semester | Paper | Title | Credits |
|---|---|---|---|
| **Semester - I** | 4411 | PHYSICAL ENVIRONMENT AND FOREST ECOSYSTEMS | 4(3+0+1) |
| | 4412 | FOREST BIOMETRY AND BIOSTATISTICS | 4(2+1+1) |
| | 4413 | ADVANCES IN SILVICULTURE | 4(3+0+1) |
| | 4414 | AGROFORESTRY PRACTICES | 4(3+0+1) |
| | 4415 | PRACTICALS AND FIELD TRAINING | 4(0+0+4) |
| **Semester -II** | 4421 | NATURAL RESOURCE MANAGEMENT AND ECONOMICS | 4(3+0+1) |
| | 4422 | FOREST AND ENVIRONMENTAL LEGISLATION | 4(3+1+0) |
| | 4423 | FOREST BIODIVERSITY AND CONSERVATION | 4(3+0+1) |
| | 4424 | ADVANCES IN FOREST MANAGEMENT | 4(3+1+0) |
| | | PRACTICALS AND FIELD TRAINING | 4(0+0+4) |
| **Semester -III** | 4431 | CLIMATE CHANGE, REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM | 4(2+0+2) |
| | 4432 | NURSERY TECHNOLOGY | 4(3+0+1) |
| | 4433 | MANAGEMENT OF INSECT– PEST AND DISEASES | 4(3+0+1) |
| | 4434 | ELECTIVES* | 4(3+0+1) |
| | | PRACTICALS AND FIELD TRAINING | 4(0+0+4) |
| • **Electives for Semester III ( Out of five papers only one paper will be opted)** | | | |
| | 4434(a) | FOREST GENETICS AND TREE IMPROVEMENT | 4(2+0+2) |
| | 4434(b) | COMPUTER APLICATION AND INFORMATION TECHNOLOGY | 4(2+0+2) |
| | 4434(c) | RESEARCH METHODOLOGY | 4(3+0+1) |
| | 4434(d) | TAXONOMY OF WOODY PLANTS | 4(2+0+2) |
| | 4434(e) | BIOTECHNOLOGY APPROACHES IN FORESTRY | 4(3+0+1) |
| **Semester - IV** | 4441 | FOREST PRODUCTS AND INDUSTRIES | 4(2+0+2) |
| | 4442 | FOREST PLANTATION AND BIO-FUELS | 4(2+0+2) |
| | 4443 | ELECTIVES** | 4(3+0+1) |
| | 4444 | DISSERTATION | 8(0+0+8) |
| | | PRACTICALS | |
| ****Electives for Semester IV ( Out of five papers only one paper will be opted)** | | | |
| | 4443)(a) | CHEMISTRY OF WOOD PRODUCTS | 4(3+0+1) |
| | 4443(b) | ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT | 4(3+0+1) |
| | 4443(c) | PROJECT ON SPECIAL PROBLEMS | 4(1+0+3) |
| | 4443(d) | ECOTOURISM: CONCEPT AND APPROACHES | 4(2+0+2) |
| | 4443(e) | MEDICINAL AND AROMATIC PLANTS | 4(3+0+1) |

# SEMESTER II

## Paper - I

## NATURAL RESOURCES MANAGEMENT AND ECONOMICS

Course No.: 4421 Credit Hours: 4(3+0+1)

### Objective

To develop understanding of students about natural resource management and economics management decisions, natural and environmental resource accounting.

### I. Course Outline

#### A. Lectures

| S.No. | Topics | No. of Lectures |
|---|---|---|
| 1. | Application of microeconomics in solving forest resource problems. | 2 |
| 2. | Emphasis on forest products, demand and supply analysis, theory of consumer behavior and utility, forest products marketing, forest capital theory, and concept of cost. | 6 |
| 3. | Regional and international trade of non-timber forest products (NTFP's), logs and lumber. | 3 |
| 4. | Impact of economics and physical variables upon forest appraisal and management decision. | 4 |
| 5. | Valuation of NTFPs and non-market goods and economics of multiple-use. Ecosystem services and market based mechanism and capital at global level, forest valuation | 6 |
| 6. | Forest certification, sustainability Analysis, SWOT Analysis. | 4 |
| 7. | Application of operations research tools in evaluating forest management alternatives in public and private forest planning, role of forestry sector in economic upliftment of communities. | 5 |

#### B. Practicals

| S.No. | Topics |
|---|---|
| 1. | Exercises on estimation of demand and supply functions. |
| 2. | Valuation of marketed forestry products. |
| 3. | Valuation of biodiversity and non-marketed forestry products. |
| 4. | Exercises on financial and economic appraisal of forestry projects. |
| 5. | EIA study of a given site |
| 6. | Exercises on marketing of forest products and international trade competitiveness. |
| 7. | SWOT analysis of a given project. |

# Paper – II

## FOREST AND ENVIRONMENTAL LEGISLATION

Course No.: 4422 Credit Hours: 4(3+1+0)

### Objective

To develop understanding of students about forest policy and laws and international conventions.

### I. Course Outline

#### A. Lectures

| S.No. | Topics | No. of Lectures |
|---|---|---|
| **1.** | Constitutional and legislative provisions – fundamental norms, divisions of legislative authority, environmental legislation and article 253. | |
| **2.** | Forest policy – Relevance and scope; National Forest Policy – 1894, 1952 and 1988. | |
| **3.** | General principles of criminal law; Indian Penal Code, criminal procedure code. Indian evidence act applied to forestry matters. | |
| **4.** | Forest laws; Indian Forest Act –1927, Forest Conservation Act 1980, general provision and silent features, Forest (Conservation) rules and amendments. | |
| **5.** | Wildlife Protect Act 1972 and amendments | |
| | The Biological diversity act, 2002. Silent features and national biodiversity authority. | |
| **6.** | National green tribunal act, 2010; important Forest Rules and Guidelines | |
| **7.** | Environmental (Protection) Act, 1986, National Environmental Policy, 2006, Forest Right Act, 2006. | |

#### B. Tutorials

| | |
|---|---|
| **1.** | **Comments and assignment of above topics.** |

# Paper – III

# FOREST BIODIVERSITY AND CONSERVATION

Course No.: 4423 Credit Hours: 4(3+0+1)

## Objective

To develop understanding of students about ecological aspects of forest, conservation of forest resources & biodiversity, consequences of depleting biodiversity and sustainable use of biodiversity.

## I. Course Outline

### A. Lectures

| S.No. | Topics | No. of Lectures |
|---|---|---|
| **1.** | Concept of biodiversity, magnitude of biodiversity, levels of biodiversity. | **3** |
| **2.** | Importance, use and threats to biodiversity. Causes of biodiversity loss and the IUCN red list. | **5** |
| **3.** | Assessment of biodiversity –inventory, monitoring, REDD, REDD+ | **3** |
| **4.** | Natural resources –Types, degradation and conservation, in-situ and ex-situ, hotspot areas, protected area net work, wildlife sanctuaries, national parks, biosphere reserves, zoo, botanical gardens, arboretum etc. and conservation of sacred groves. | **6** |
| **5.** | evaluation of forests genetical resources (FGR), Handling and storage of FGR conservation, vulnerability of FGR, quarantine laws, and FGR exchange, germplasm bank, Intellectual property rights and biodiversity | **5** |
| **6.** | Role of community in biodiversity conservation, indigenous knowledge of biodiversity, biodiversity conservation and community development, biodiversity and ecosystem services. | **5** |
| **7.** | International efforts for conservation of biodiversity – International Union for Conservation of Nature and Natural Resources, United nations Environmental Program, Convention on Biodiversity, World Heritage Convention, Conference on Parties, Convention on International Trade of Endangered species, World Wide Fund for nature and natural Resources. | **3** |

### B. Practicals

| S.No. | Topics |
|---|---|
| **1.** | Field inventory for biological diversity and determination of minimum size of sampling unit for trees, shrubs and herbs |
| **2.** | Collection, identification and herbarium preparation of plant species. |
| **3.** | Calculation of species richness index in different forests. |
| **4.** | Calculation of different indices of biodiversity, evenness, concentration of dominance, similarity index. |
| **5.** | Calculation of α, β and γ diversity of a landscape. |
| **6.** | Visit to nearby community forest and analyses their role in conservation of biological diversity. |
| **7.** | Visit to National Parks, wildlife sanctuaries, botanical gardens and arboretum. |
| **8.** | Comment on various national and international agencies. |
| **9.** | List of IUCN indexed plants of India |

# Paper IV

# ADVANCES IN FOREST MANAGEMENT

Course No.: 4424 Credit Hours: 4(3+1+0)

## Objective

To provide knowledge about forest management, ecosystem management, site quality evaluation, stand density & forest valuation.

## I. Course Outline

### A. Lectures

| S.No. | Topics | No. of Lectures |
|---|---|---|
| 1. | Introduction, principles, concept, criteria, scope, objectives, elements and methods of forest management. | 4 |
| 2. | Forest organization, sustained yield, rotation and normal yield. | 4 |
| 3. | Types of yield, yield regulation in regular and irregular forests (area, volume, increment, volume and increment basis) | 5 |
| 4. | Yield table and stand table, yield prediction models, their preparation and applications. | 5 |
| 5. | Management of community forests- participatory forest management, joint forest management, forest development agencies, Compensatory Afforestation Fund Management and Planning Authority. | 6 |
| 6. | Forest Working Plan – preparation, working plan code, measurement of growing stock, case study of working plan division. | 6 |

### B. Tutorials

| | |
|---|---|
| 1 | Calculation of growing stock and yield using different formula |
| 2 | Calculation of yield data using yield table |
| 3 | visit to forest division in which working plan is under progress |
| 4 | Preparation of different growth and yield models |
| 5 | Case study of working plan of a forest division. |