



**List of Courses Focus on Employability/ Entrepreneurship/  
Skill Development**

**Department : Rural Technology and Social Development**

**Programme Name : M.Sc. Rural Technology**

**Academic Year : 2023-24**

**List of Courses Focus on Employability/ Entrepreneurship/Skill Development**

Sr. No.	Course Code	Name of the Course
1.	RTPATC-1	Concepts of Statistical Analysis
2.	RTPALC-1	Laboratory Course (Based on RTPATC-1)
3.	RTPATC-2	Innovation, Appraisal and action for Rural Development
4.	RTPALC-2	Field based work/ Survey (Based on RTPATC-2)
5.	RTPATG-1	Sericulture
6.	RTPALG-1	Laboratory Course (Based on RTPATG-1)
7.	RTPATG-2	Lac production technique
8.	RTPALG-2	Laboratory Course (Based on RTPAGT-2)
9.	RTPATO-1	Natural Product and Processing Techniques
10.	RTPALO-1	Laboratory Course (Based on RTPATO-1)
11.	RTPBTC-1	Fundamentals of Medicinal Plant
12.	RTPBLC-1	Laboratory Course (Based on RTPBTC-1)
13.	RTPBTC-2	Concept of Remote Sensing and GIS-I
14.	RTPBLC-2	Laboratory Course (Based on RTPBTC-2)
15.	RTPBTA-1	Research Methodology and Ethics
16.	RTPBTG-1	Rural Waste Management
17.	RTPBPG-1	Laboratory Course (Based on RTPBTG-1)
18.	RTPBTG-2	Soil and Water Conservation Engineering
19.	RTPBPG-2	Laboratory Course (Based on RTPBTG-2)
20.	RTPCTC-1	Drug Formulation and Extraction
21.	RTPCLC-1	Laboratory Course (Based on RTPCTC-1)
22.	RTPCTC-2	Geospatial Technology and its Application
23.	RTPCLC-2	Laboratory Course (Based on RTPCTC-2)
24.	RTPCTG-1	Mushroom Cultivation Technology
25.	RTPCLG-1	Laboratory Course (Based on RTPCTG-1)
26.	RTPCTG-2	Beekeeping Techniques



27.	RTPCLG-2	Laboratory Course (Based on RTPCTG-2)
28.	RTPCTA-1	Instrumentation and Techniques
29.	RTPCLA-1	Laboratory Course (Based on RTPCTA-1)
30.	RTPCSA-1	Seminar
31.	RTPDTG-1	Computer application
32.	RTPDTG-2	Entrepreneurship
33.	RTPDDC-1	Dissertation/ Project work followed by seminar



## Scheme and Syllabus

Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

DEPARTMENT OF RURAL TECHNOLOGY & SOCIAL DEVELOPMENT,  
GURU GHASIDAS VISHWAVIDYALAYA  
SEMESTER SCHEME  
Master of Science of Rural Technology

M. Sc. I SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPATC-1	Concepts of Statistical Analysis	70	30	-	100
RTPALC-1	Laboratory Course (Based on RTPATC-1)	-	30	70	100
RTPATC-2	Innovation, Appraisal and action for Rural Development	70	30	-	100
RTPALC-2	Field based work/ Survey (Based on RTPATC-2)	-	30	70	100
RTPATG-1	Sericulture	70	30	-	100
RTPALG-1	Laboratory Course (Based on RTPATG-1)	-	30	70	100
OR					
RTPATG-2	Lac production technique	70	30	-	100
RTPALG-2	Laboratory Course (Based on RTPATG-2)	-	30	70	100
RTPATO-1	Natural Product and Processing Techniques	70	30	-	100
RTPALO-1	Laboratory Course (Based on RTPATO-1)	-	30	70	100
Total		280	240	280	800

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Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

M. Sc. II SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPBTC-1	Fundamentals of Medicinal Plant	70	30	-	100
RTPBLC-1	Laboratory Course (Based on RTPBTC-1)	-	30	70	100
RTPBTC-2	Concept of Remote Sensing and GIS-I	70	30	-	100
RTPBLC-2	Laboratory Course (Based on RTPBTC-2)	-	30	70	100
RTPBTA-1	Research Methodology and Ethics	30	20	-	50
RTPBTG-1	Rural Waste Management	70	30	-	100
RTPBPG-1	Laboratory Course (Based on RTPBTG-1)	-	30	70	100
OR					
RTPBTG-2	Soil and Water Conservation Engineering	70	30	-	100
RTPBPG-2	Laboratory Course (Based on RTPBTG-2)	-	30	70	100
Total		240	200	210	650

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Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

**M. Sc. III SEMESTER**

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPCTC-1	Drug Formulation and Extraction	70	30	-	100
RTPCLC-1	Laboratory Course (Based on RTPCTC-1)	-	30	70	100
RTPCTC-2	Geospatial Technology and its Application	70	30	-	100
RTPCLC-2	Laboratory Course (Based on RTPCTC-2)	-	30	70	100
RTPCTG-1	Mushroom Cultivation Technology	70	30	-	100
RTPCLG-1	Laboratory Course (Based on RTPCTG-1)	-	30	70	100
OR					
RTPCTG-2	Beekeeping Techniques	70	30	-	100
RTPCLG-2	Laboratory Course (Based on RTPCTG-2)	-	30	70	100
RTPCTA-1	Instrumentation and Techniques	70	30	-	100
RTPCLA-1	Laboratory Course (Based on RTPCTA-1)	-	30	70	100
	*University elective/ tour/ sport/ industrial training/ others				
RTPCSA-1	Seminar	-	20	30	50
Total		280	260	310	850

**M. Sc. IV SEMESTER**

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPDTG-1	Computer application	70	30	-	100
OR					
RTPDTG-2	Entrepreneurship	70	30	-	100
RTPDDC-1	Dissertation/ Project work followed by seminar	300	Viva-voce 100		400
					500

Dissertation must be compulsory for all students. Students will have liberty to complete his dissertation work either in the Department or any other Department or Institution. If student desires to complete his dissertation work outside the Department, he/she will have bear all expenses.

Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

**Syllabus  
2021-22**

**Master of Science of Rural Technology**

M.Sc. I SEMESTER		
Course Code: RTPATC1	Credit-4	Marks: 100
Course Title: CONCEPTS OF STATISTICAL ANALYSIS		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand concepts of statistics and its applications in various fields.
- Analyze the data and interpret it in logical manner.

Introduction, concept, meaning, definition and importance of statistics, concept of variables, data coding and decoding, classification (parametric and non parametric), tabulation, graphical and diagrammatic representation of numerical data.

Measurement of central tendency- mean, mode, median, dispersion- Mean deviation, Standard deviation.

Probability Concept, various definition of probability, Addition theorem of probability, Probability distributions (viz. Binomial, Poisson and normal) and their applications.

Coefficient of Variation, Skewness and Kurtosis, Correlation and Regression Analysis, Analysis of variance (ANOVA).

Sampling Methods- Statistical Test Hypothesis, Barrier test- z, t, F and Chi square distribution.

M.Sc. I SEMESTER		
Course Code: RTPALC1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPALC1)		

1. Coding and decoding of data.
2. Problems based measurement of central tendency.
3. Problems based measurement of dispersion
4. Testing of hypothesis.
5. Analysis of variance (ANOVA).
6. To study the statistical software.
7. Graphical representation of numerical data

**Reference Books**

An Introduction to Statistical Methods - Gupta C.B.  
Quantitative approach to managerial decision- Hien, L.W.  
Statistics for Business & Economics, Lawrence B. Morse.  
Statistics for Management, Levin, Richard I. and David S. Rubin.  
Fundamentals of Statistics- D.N. Elhance, Veena Elhance and B. M. Aggrawal  
Basic concept in statistics, K.S. Kushwaha





Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

M.Sc. I SEMESTER		
Course Code: RTPATC2	Credit-4	Marks: 100
Course Title: INNOVATION, APPRAISAL AND ACTION FOR RURAL DEVELOPMENT		

#### Learning outcomes

On completion of the course, the students will be able to:

- Learn about the characteristic of innovation and diffusion process among the social system.
- Conduct PRA, RRA and formulate the social planning.

Innovation- Definition, Characteristic of innovation, importance of innovation in day today life, Technology diffusion -Definition, innovation decision process and factors that affect diffusion process.

Adoption process - concept, stages in adoption process, rate of adoption, adopter categories, adopter's characteristics, factor that affect adoption process.

Communication- Definition, concepts and various models of communication, types of communication, barriers in communication. Transfer of Technology - Concept of Technology, Appropriate Technology- Definition and characteristics, different Models of technology transfer, barriers in Transfer of Technology.

PRA- Definition, Principles and Approaches of PRA, PRA Tools- Mapping, Types of mapping- social resource/ land use pattern map, enterprise map, transect walk, time line, change and trends, Matrix ranking, Mobility map, Venn diagram, RRA and PLA: Introduction, foundation, process, difference between RRA and PRA, Project appraisal.

Course Code RTPALC2	Credit-1	Marks:100
Field based course (Based on RTPATC2)		

#### Field based exercises:

- Exercise based on PRA Approaches
- To study communication models.
- To study adoption process.

#### Reference Books

Gandhian Thought - J. B. Kripalani.  
Challenging the Professions - Robert Chambers  
Human Problems in Technological Change - E. E. Russel  
Communication of Technological innovations- O.P. Dhama  
Participatory rural appraisal in agricultural animal husbandary- Shagufta Jamal and H. P. S. Arya  
Participatory rural appraisal and questionnaire survey-Neela Mukharjee  
Participatory rural appraisal methodology and application-Neela Mukharjee  
Participatory learning and action- Neela Mukharjee  
Participatory rural appraisal methods and application in rural planning- Amitava Mukharjee

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Department of Rural Technology & Social Development  
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Semester-wise syllabus for PG Course

M.Sc. I SEMESTER		
Course Code: RTPATG1	Credit-4	Marks:100
Course Title: SERICULTURE		

#### Learning outcomes

On completion of the course, the students will be able to:

- Understand scientific method of silk production technique and management.
- Aware various Government schemes / programs related to sericulture.

General sericulture: Definition, silk types, history and importance of sericulture, Geographical distribution of various species and economic races of silkworms, Government schemes / programs related to sericulture.

Basic biology of silk insect: Silkworm taxonomy based on mulberry and non-mulberry silk worms-Tasar, Eri and Munga, life cycle including moulting and metamorphosis, Diseases of silkworm, Pests of silkworm.

Host plant management: Host plants for sericulture and their propagation, effects of agro-climatic conditions on the growth of host plants with special reference to mulberry, Diseases of mulberry plant, Mulberry pest management.

Silkworm rearing: Mud house rearing, silkworm rearing (C.S.B. proposed model rearing house), Rearing appliances, disinfection, disinfectants, bed cleaning, feeding of worms, Maintaining optimum condition of rearing, brushing, frequency of spacing, care during moulting, Mounting and moutage, process of spinning, cocoon harvesting, Rearing method: chawki rearing or young age worm rearing, Late age silkworm rearing (according to 100 dfl).

Post cocoon technology and silk technology: method of cocoon testing and grading, cocoon stifling, storage of cocoon, deflossing, cocoon riddling, mixing or blending, cocoon cooking, brushing, Concept of difference reeling machines, reeling operation, reeling end formation, testing and grading of raw silk, Degumming, bleaching, dyeing of silk yarn, Twisting, Reeling Re-reeling, lacing, skeining, weaving of silk.

M.Sc. I SEMESTER		
Course Code: RTPALG1	Credit-1	Marks:100
Course Title: Laboratory Course (Based on RTPATG-1)		

- Study of host plants of silk worms.
- Plantation techniques (pit and row) of host plants.
- Study of propagation techniques of host plants.
- Study of morphological characters of silk worm.
- Identification of pests and predators of silk worm.
- Dissection of alimentary canal and silk gland and study of their various parts.
- Visit to nearest silk worm rearing centers.
- Visit to rearing centers to observe the silk worm diseases and collection of diseased worms.
- Comparative study of good and defective cocoons.

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Semester-wise syllabus for PG Course

**Reference Books:**

Sericulture introduction - Ganga, G.  
Seri Manual - FAO Manual  
Appropriate Sericulture - Jolly, M.S.  
Sericulture in India- Vol. I to IV, H.O. Agrawal and M.K. Seth.  
An introduction to Sericulture - G.J. Sulochana  
Principle of temperate Sericulture - Dr. A.S. Kamal, Kamayani Publisher

M.Sc. I SEMESTER		
Course Code: RTPATG2	Credit-4	Marks: 100
Course Title: LAC PRODUCTION TECHNIQUE		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand economic importance of lac insect and lac produces.
- Enhance their knowledge and technical skills to produce lac in various host plants.

Lac insect: meaning, concept and economic importance of lac cultivation. Classification and morphology and life cycle of lac insect, types of lac insect, history of lac cultivation, area and geographical distribution of lac insect, natural habitat of lac insect, types of lac and its characteristics.

Lac production in *Butea monosperma*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Ziziphus mauritiana*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni and kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Schleichera oleosa*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management winter and summer crops, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Flemingia semialata*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of kusmi lac insect, propagation and nursery management, planting and nutrient management, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management winter and summer crops, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

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Semester-wise syllabus for PG Course

M.Sc. I SEMESTER		
Course Code: RTPALG2	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPAGT2)		

1. Identification and preparation of different host plants for lac cultivation.
2. Selection and inoculation of broodlac in host plant.
3. Removal of used-up broodlac sticks from host plants.
4. Processing of lac.
5. Lac crop protection.
6. Study of equipments used in lac cultivation.
7. Identification of lac insect and lac crops.

**Reference Books:**

Chapman: The Insects: structure and function 94<sup>th</sup> ed, 1998, ELBS)  
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)  
McGavin: Essential Entomology 92001, Oxford Univ Press)  
Srivastava: A textbook of applied entomology, vol.I & vol II (1993, Kalyani publishers)  
The Insect. Ramesh Arora and G. S. Dariwal  
Atlas of Indian Lac, Ajit Prasad Jain.  
Lac cultivation in India. M.G.Kamath  
A handbook of shellac Analysis. G.N.Bhattacharya and P.K.Bose.

M.Sc. I SEMESTER		
Course Code: RTPATO1	Credit-4	Marks: 100
Course Title: NATURAL PRODUCT AND PROCESSING TECHNIQUES		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand different types of natural products and its importance.
- Learn processing of important natural products.

Natural products: Introduction, plants as a source of various products, types of natural products, natural products and tribal connection, dependence of tribes on forest, various method of collection, storage and marketing of natural products, .

Fibre: Introduction, classification of fibres, plant origin fibres, types, study of cotton, flax and jute fibre, various fibre industries and economic importance.

Gum and Resin: Introduction, classification, physical and chemical composition, plant origin gum and resins, collection techniques, processing and economic importance.

Dye: Sources, types of dyes, chemical nature, characteristics of natural dyes, preparation of natural dyes, extraction of dye, processing and uses.





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Semester-wise syllabus for PG Course

Course Code: RTPALO1	Credit-1	Marks 100
Laboratory course (Based on RTPATO1)		

**Laboratory exercises:**

1. Identification of fibre producing plants.
2. Study of fibre processing techniques.
3. Identification of gum producing plants & characteristics.
4. Tapping & collection of gums from various plant sources.
5. Study of various types of resin & their sources.
6. Identification of dye producing plants.
7. Study on dye preparation techniques.
8. Microscopic study of fibres.
9. Preparation of herbaria.

Department of Rural Technology & Social Development  
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Semester-wise syllabus for PG Course

Master of Science of Rural Technology  
Second Semester

M.Sc. II SEMESTER		
Course Code: RTPBTC1	Credit-4	Marks: 100
Course Title: FUNDAMENTALS OF MEDICINAL PLANTS		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand medicinal important of secondary metabolites of plants.
- Learn the Government policies and marketing potential of crude drugs.

Methods of plant classification, Taxonomic keys, Herbarium, Taxonomic study of important plant families of Chhattisgarh with special reference to family Asclepiadaceae, Apiaceae, Chenopodiaceae, Euphorbiaceae, Combretaceae, Liliaceae.

Medicinal plant found in Chhattisgarh: General aspects and Medicinal values of- *Aegle marmelos*, *Cinnamomum sps.*, *Gloriosa superba*, *Ipomoea nil*, *Mucuna pruriens*, *Piper nigrum*, *Vitex nigundo*.

Alkaloids: Properties, isolation and extraction, classification and alkaloid containing drug; Terpenes and Terpenoids: Properties, Isolation, classification and drugs containing terpenes and terpenoids.

Tannins: Properties, isolation and extraction, classification and tannin containing drugs. Marine drug: Properties, classification uses; Mineral drug: Sources, constituents and uses.

Legislation and policy of medicinal plants: National and State Medicinal Plant Board, Conservation of medicinal plants, Market potential of crude drugs, Goals of national policy, Future action plans.

**Reference Books**

Medicinal plants of India Vol 1 & 2 ICAR - Kirtikar & Basu.  
Compendium of Indian Medicinal plants Vol 1-4 - R. P. Rastogi & B.N. Mahrotra.  
Indigenous medicinal specialties - U.S. Narayan Rao.  
Useful plant of Neotropical origin - Heing Brucher.  
Cultivation and utilization of Aromatic plants - C.K. Atal and B.M. Kapoor.  
Cultivation and utilization of medicinal plants - C.K. Atal and B.M. Kapoor.  
Plant Taxonomy- O.P. Sharma  
Essential of Plant Taxonomy and Ecology-M.P. Singh and S.G. Abbas



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Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RTPBLC1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBLC1)		

1. Study of locally available plants of families Asclepiadaceae, Apiaceae, Chenopodiaceae, Euphorbiaceae, Combretaceae, Liliaceae.
2. To study extraction process, chemical test to identify Alkaloids
3. To study extraction process, chemical test to identify Terpenes and Terpenoids.
4. To study extraction process, chemical test to identify Tannins.
5. To study source of mineral drugs and their uses.

M.Sc. II SEMESTER		
Course Code: RTPBTC2	Credit-4	Marks: 100
Course Title: CONCEPTS OF REMOTE SENSING AND GIS-I		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the concept and application of remote sensing and GIS software.
- Learn the basic of satellite images and toposheets.

Concepts of Remote Sensing with introduction, Early History, Energy Sources & Radiation Principles, Energy Interactions in atmosphere, Energy interactions with earth surface features, Spectral Reflectance of vegetation, Soil & water.

Satellite: Indian satellite, Earth Resource satellite, Ocean satellite, Resource-sat satellite, Cartosat satellite etc. and their uses.

Photogrammetry-Introduction, Types of Aerial Photographs including UAV, Basic principles of Photogrammetry, Geometry of a vertical aerial photograph, photographic Scale, Applications of vertical aerial photograph, Thematic Cartography: Commitments, concern and solution, Influence of thematic Atlases, Influences of distant cartography, and Innovative trends in mapping.

Digital Image Processing (DIP)-Introduction, Pre-processing of image-Image interpretation, Geometric & Radiometric Correction, Resolution, Image Enhancement, Contrast Stretching, Filters, Edge Enhancement.

Microwave Remote Sensing-Introduction, sensors, instruments, radar operating principles, synthetic aperture RADAR, radar returns and image signatures, radar image characteristics, basics of LIDAR.

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Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RTPBLC2	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBTC2)		

1. Geometric and radiometric correction of satellite data, Image enhancement techniques, Principal component analysis.
2. Supervised classification, Supervised classification schemes (Maximum likelihood, nearest neighbor and artificial neural network classification), Vegetation indices.
3. Creation of digital evaluation model through contour digitization and surface hydrology.
4. Digitization of different features of given topo-sheet. Editing attributes of geo-database features. Creating different features like polygon line, tie, polyline etc.
5. Creation of personal geo-database.

**Reference Books**

Remote Sensing – Principles & interpretation - F.F. Sabins  
Digital Remote Sensing - Dr. P. Nag, Dr. M. Kudrat  
Principles of Remote Sensing - P.J. Curran.  
Basics of Remote Sensing – S. Joseph  
Basics of remote sensing and photogrammetry – Lilliland

M.Sc. II SEMESTER		
Course Code: RTPBTAI	Credit-2	Marks: 50
Course Title: RESEARCH METHODOLOGY AND ETHICS		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the nature, types and importance of research methodology and ethics.
- Apply research methodology procedures according to their nature of research.

Research, types of research, Nature, scope of research and importance of research methodology, steps of scientific inquiry and study of social phenomenon, research problems, criteria for identification of research problems, formulations and statement of research objectives.

Hypothesis- Meaning and role in research, type of hypothesis, testing of hypothesis, method of data collection, level of measurement, data sources; observational and survey methods, case studies, types of schedule, questionnaires.

Research design- Exploratory, descriptive, and experimental research design, qualitative and quantitative research. Complete Randomized Block Design (CRD), Randomized Block Design (RBD), Latin Squares Design (LSD) and factorial design.

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Department of Rural Technology & Social Development  
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Semester-wise syllabus for PG Course

Research reporting and scientific writing- Preparation of research proposal, compilation of thesis, dissertation, compiling bibliography, reports, compilation of research paper, paper presentation, research ethics.

**Reference Books**  
Survey Method  
Exploring research  
Guide to the successful thesis and dissertation V<sup>th</sup> Edition  
Fundamentals of Statistics

M.Sc. II SEMESTER		
Course Code: RTPBTG1	Credit-4	Marks: 100
Course Title: RURAL WASTE MANAGEMENT		

**Learning outcomes**

On completion of the course, the students will be able to:

- Aware about sanitation and waste water management.
- Adopt different methods of waste management.

Introduction of Rural waste, Type of waste, different methods of systematic collection and disposal of waste, Types of sewer.

Concept of sewage treatment, principle of primary, secondary treatment and Tertiary treatment of wastewater, General composition of sewage, method of determination of B.O.D. and C.O.D.

Rural Sanitation- Provision of safe and potable water for domestic purposes, collection and disposal of dry refuse, collection and disposal of sullage, disposal of excretal waste, night soil disposal without water carriage, Construction of low cost latrines in rural areas- Septic tanks, soak pit, privy pit and bore hole privy, can privy, concrete vault privy, aqua privy, PRAI latrine.

Waste water management- performance criteria for waste water management system, house drainage plan, classification of traps- P-trap, Q-trap, S trap, floor trap, gully trap, intercepting trap, grease trap, principle for efficient drainage system.

Solid waste management- classification of solid waste, quantity and composition of refuse, collection and removal of refuse, transport of refuse, disposal of refuse- controlled tipping, landfill, trenching, dumping into sea, pulverization, incineration; composting- composting by trenching, open window composting, mechanical composting, composting adopted in India, Biogas technology-properties of biogas, types of biogas plant recognized by MNES (Ministry of Non-conventional Energy Sources).

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Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RTPBPG1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBTG1)		

- 1) To study types of waste material.
- 2) To study the physical treatment of waste water.
- 3) To study the biological treatment of waste water.
- 4) To study the chemical treatment of waste water.
- 5) Visit to sewage treatment plants.
- 6) To study biogas technology of solid waste management.
- 7) To study landfill method of solid waste management.
- 8) To study various model of privy.
- 9) To study biogas technology as solid waste management.

**Reference Books**  
Rangwala S.C., Water Supply & Sanitary Engineering, Charotar Publishing House (P) Ltd., Anand.  
Gurcharan Singh, Water Supply & Sanitary Engineering, Standard Publishers Distributors, Delhi.  
Garg, S.K., Water Supply Engineering, Khanna Publishers, Delhi.  
Gupta, D.V. Water Supply & Sanitary Engineering, Asian Publishers, Muzaffarnagar  
Modi, P.N. Water Supply Engineering, Standard Book House, Delhi

M.Sc. II SEMESTER		
Course Code: RTPBTG2	Credit-4	Marks: 100
Course Title: SOIL AND WATER CONSERVATION ENGINEERING		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the soil formation, soil profile, soil structure and different type of soil nutrients.
- Understand the basic concept of soil water conservation and watershed management.

Soil- Definition, Soil as a three phase system, Soil-Plant-Water relationship, soil moisture content, soil profile, density, void ratio, porosity, soil texture, soil structure and degree of saturation.

Basic concept of soil erosion, control of soil erosion, soil loss estimation, concept of runoff and its estimation, water budgeting, estimation of rainfall erosivity and erodibility.

Planning, design, construction and maintenance of water harvesting structure, soil and water conservation structure, GIS application in Planning, designing, construction and maintenance of water harvesting structure.

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Watershed management concept- objectives, characterization, type of watershed, planning, execution, integrated community participation and evaluation, GIS application in watershed management.

Irrigation- Definition, Types of irrigation, Source of irrigation water. Irrigation methods and efficiencies, Drainage - Definition, surface and sub-surface drainage, factors influencing drainage.

Course Code: RTPBTG2	Credit-1	Marks100
Laboratory course (Based on RTPBTG2)		

**Laboratory exercises:**

1. Study of different water harvesting structure.
2. Study of GIS Application in watershed management
3. Study of different components of sprinkler and drip irrigation system
4. Study of continuous and staggered contour trenches
5. Study of different components of farm pond
6. Water budgeting.

**Reference Books**

Introduction to soil and water conservation engineering, Mal, B C, Kalyani publishers  
Irrigation Engineering-Agarwal G.D., B. Bharti Prakashan, Merrut.  
Irrigation Engineering, -Modi P.N., Standard Book House, Delhi.  
Irrigation Engineering- Dr. Bharat Singh, Nem Chand & Bros., Roorkee  
Introductory Soil Science, Dilip Kumar Das, Kalyani Publishers.  
Soil and water conservation engineering, R. Suresh  
Irrigation: Theory and practices, A.M. Michael

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Master of Science of Rural Technology

Third Semester

M.Sc. III SEMESTER

Course Code: RTPCTC1	Credit-4	Marks: 100
Course Title: DRUG FORMULATION AND EXTRACTION		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the constitution of drug and drug delivery system.
- Learn drug formulation and extraction phenomenon.

**Introduction to Dosage forms-** Desirable properties, classification and application of dosage forms, New drug delivery system.

Principles and methods of extraction, theory of drug extraction, Hydro-distillation, expression, quality assurance of essential oils maceration, digestion, percolation, soxhletation, super critical fluid extraction, other extraction methods.

**Aromatic Plants-** History, Revenue potential, industrial significance, medicinal uses; cultivation and management of aromatic plants - Camphor, Citronella, Eucalyptus, Lavender, Lemongrass, Mints, Palmarosa, Sandalwood.

**Analytical pharmacognosy-** Drug adulteration, Drug evaluation- morphological, microscopic, chemical, Phytochemical investigation, physical, biological evaluation, hepatoprotective activity, hypoglycemic activity, antifertility testing.

**Drug formulation-** Pharmacopoeial preparations, principles and methods of preparation of aromatic waters, spirits, elixirs, syrups, tincture solution and special preparation of mouthwashes.

M.Sc. III SEMESTER

Course Code: RTPCLC1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPCTC1)		

1. Study of traditional plant and their part used as folklore medicine.
2. Extraction and distillation of Eucalyptus, Lemongrass, Mints, Sandalwood.
3. Extraction of volatile oil, Extraction of tannin.
4. Formation of Aromatic water, spirits, tinctures.
5. Extraction of Alkaloids, Chemical test for tannin, alkaloid, maceration, percolation.
6. Extraction of medicinal plants by Soxhlet method, Distillation method.
7. Drug formulation- Antimicrobial activity of medicinal plant.

**Reference Books**

Medicinal plants of India Vol 1 & 2 ICAR by Kirtikar & Basu .  
Indigenous medicinal specialties: U.S. Narayan Rao  
Useful plant of Neotropical origin: Heing Brucher  
Cultivation and utilization of Aromatic plants: C.K. Atal and B.M. Kapoor



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Pharmacognocny - Trease & Evans.  
Pharmacognocny- Gokhale, kokate & Purohit  
Cultivation and Utilization of Aromatic plants - L.K. Atal& B.M. Kapoor.  
Professional Pharmacy - Jain & Sharma.  
Aromatic Plants- Baby S. Skaria, P.P. Joy, G. Mathew, A. Joseph and R. Joseph  
Medicinal Plants- A.Kurian and M.A. Sankar  
Medicinal Plants ethnobotanical Approach- P.C. Trivedi  
Aromatic Plants- Baby S. Skaria, P.P. Joy, G. Mathew, A. Joseph and R. Joseph  
Compendium of Indian Medicinal plants Vol 1-4 R.P. Rastogi& B.N. Mahrotra.

M.Sc. III SEMESTER		
Course Code: RTPCTC2	Credit-4	Marks: 100
Course Title: GEOSPATIAL TECHNOLOGY AND ITS APPLICATION		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the basic concept of GPS and GIS.
- Learn the data base management system and application.

Basics of GIS: Definition, components of GIS, DBMS: data base approach, advantage and disadvantage, data model - classic data model, hierarchical data model, network and relational data models, various interpolation techniques.

Types of data structure, raster and vector format, image data format - BSQ, BIL, BIP, advantage and disadvantage of various data structure, data input - digitization and scanning method, web GIS, map projection, elements of map, introduction to GPS and DGPS its application.

Application of remote sensing and GIS - Mapping and monitoring of land use land cover, forest resource management, principal and approaches of crop production forecasting, soil classification, surface hydrology analysis.

Urban and rural area planning - urban and rural area sprawl and change detection studies, population estimation, site suitability analysis for - settlement, transportation irrigation system, storage and other facilities.

M.Sc. III SEMESTER		
Course Code: RTPCLC2	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPCTC2)		

1. Practice based on ArcGIS and QGIS
2. To generate various Indices map - NDVI, NDWI, NDBI, SAVI
3. Data Collection and Interpolation methods for map layout.

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4. Surface analysis.
5. Layout preparation.
6. Creation of personal and geo-data base.

**Reference Books**

Remote Sensing - Principles & interpretation - F.F. Sabins  
Digital Remote Sensing - Dr. P. Nag, Dr. M. Kudrat  
Principles of Remote Sensing - P.J. Curran.

M.Sc. III SEMESTER Elective (PG)		
Course Code: RTPCTG1	Credit-4	Marks: 100
Course Title: MUSHROOM CULTIVATION TECHNOLOGY		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand the importance of Single Cell Protein.
- Learn the commercial production of mushroom and its marketing potential.

Introduction, General characteristics of Mushroom, history of mushroom cultivation; biology of mushrooms; Identification of mushroom, Nutritional and Medicinal value of mushrooms; Poisonous mushrooms and its poisoning; edible mushrooms and its cultivation in India and world.

Cultivation technology, infrastructure, equipments and substrates in mushroom cultivation, mushroom unit or mushroom house, pure culture, Spawn, preparation of spawn, raw materials for the cultivation of mushroom, Compost: materials used for compost preparation, compost technology in mushroom production; Casing: raw material used for casing, preparation of casing material.

Cultivation of important mushrooms: General process for the cultivation of *Agaricus bisporus*, *Pleurotus ostreatus*, *Calocybe indica*, *Volsvariella volvaceae* and *Ganoderma lucidum*, Pests and Pathogens of mushrooms and their management.

Storage and food preparation from mushrooms: Methods of storage of mushroom, Long term and short term storage of mushrooms, Foods/recipes from mushrooms; Mushroom research centers/farms: National level and regional level, Marketing of mushrooms in India and world.

Course Code: RTPCLG1	Credit-1	Marks: 100
Laboratory course (Based on RTPCTG1)		

**Laboratory Exercises**

1. Morphology and identification of local mushroom and preserved specimen of mushroom.
2. Sterilization of glassware, equipments, and culture media used in mushroom cultivation.

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3. Preparation of culture media and mother culture.
4. Preparation of spawn: Grain spawn, Straw spawn, Sawdust spawn.
5. Preparation of compost and known compost formulations.
6. Cultivation procedure for *Agaricus bisporus*.
7. Cultivation procedure for *Pleurotus ostreatus*.
8. Criss-cross bed and out-door method for cultivation of *Volvariella volvacea*.
9. Cultivation procedure for *Ganoderma lucidum*.
10. Cultivation procedure for *Calocybe indica*.
11. Storage and preservation of mushroom.

**Reference Books:**

The Mushroom Identifier- David Pegler & B. Sproner.  
Mushroom Cultivation- B.Tripathi & H.P.Shukla  
Mushroom Growing- S.C.Day  
A handbook of Mushroom- Neeta Bhale

M.Sc. III SEMESTER		
Course Code: RTPCTG2	Credit-4	Marks:100
Course Title: BEEKEEPING TECHNIQUES		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand economic importance and ecological benefits of beekeeping.
- Enhance their knowledge and technical skills on beekeeping.

**Introduction:** Introduction to beekeeping, beekeeping in India, benefits of beekeeping, honey bee products, potential market of bee products, nature of work, the world of honey bees; honey bee species of economic importance, bee biology, castes of bees, stages of development in honey bees, sex differential in honey bees, bee food plants, communication among bees.

**Beekeeping equipments:** Fixed comb hives, movable-comb hives, movable-frame hives, specifications of beehives- Langstroth ten-frame hive; Newton's bee hive; advantages of rearing bees in modern beehives, other beekeeping equipments- hive stand, smoker, protective equipments, comb foundation sheet, dummy division board/movable wall, porter bee escape board, drone excluder or drone trap, swarm trap, pollen trap, division board / sugar feeder and various hive tools.

**Site selection and management:** Selection of site, starting a colony, establishment of a beehive; capturing a swarm of bees, purchase a packaged bee colony, using nucleus; division of colony, inspecting the bee colony, safety measures; apiary management- colony inspection, cleaning in beehive, feeding bees with sugar syrup, addition of artificial comb foundation sheets, bee swarming and its management; control of swarming, collecting swarms; uniting bee colonies (newspaper method), crop management for beekeeping, extraction of honey; Seasonal management, precautions while handling the bees, beekeeping records, management of bee colonies for pollination, advantages of bee pollination.

**Rearing and protection management:** Bee breeding and queen rearing- bee breeding, rearing of queen bees, types of queen rearing, biological basis of queen rearing, selection of mother stock, production of better quality queens, methods of queen rearing- Alley's method, Miller's

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method, grafting method (Doolittle method); queen rearing time table, queen cell builders, instrumental insemination, equipments, scope, benefits of bee breeding, migration of bee colonies, migratory beekeeping problems, various pests and diseases of honey bees and their management.

**Harvesting, processing and marketing of bee products:** Collection of nectar and honey, harvesting of honey, composition of fully ripened honey, physical properties of honey, grading of honey, packaging and labelling, uses of honey, storage, honey standards, Indian honey regulations, bee wax- composition and property, processing, uses of bee wax; bee venom- properties, production, uses; propolis- propolis collection technology, properties and uses; royal jelly- properties, production and uses; pollen- composition, pollen collecting technology; marketing of bee products, constraints in honey production, government schemes and policies related to beekeeping.

M.Sc. III SEMESTER		
Course Code: RTPCLG2	Credit-1	Marks:100
Course Title: Laboratory Course (Based on RTPCTG2)		

1. Identification of honey bee.
2. Study of equipments used in bee keeping.
3. Study of methods of queen rearing techniques.
4. Study of extraction and processing of honey.
5. Microscopy of different pollens.
6. Study of different diseased condition of honey bees.
7. Identification of pests of honey bees.
8. Study of honey quality.

**Reference Books:**

Chapman: The Insects: structure and function 94<sup>th</sup> ed, 1998, ELBS)  
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)  
McGavin: Essential Entomology 92001, Oxford Univ Press)  
Srivastava: A textbook of applied entomology, vol.I & vol II (1993, Kalyani publishers)  
The Insect. Ramesh Arora and G. S. Darsiwal  
The World of Honey Bee. A.S.Atwal  
Bee Keeping for pleasure and profit. Moh. Naim.  
Honeybee Disease and Management. D.P.Abrol.  
Perspective In Indian Apiculture. R.C.Mishra

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M.Sc. III SEMESTER		
Course Code: RTPCTA1	Credit-4	Marks: 100
Course Title: INSTRUMENTATION AND TECHNIQUES		

**Learning outcomes**

On completion of the course, the students will be able to:

- Understand principle and functioning of various instruments generally used in drug evaluations.
- Enhance their technical skills on slide preparation.

**Principle, structure, functioning and applications.** Type of microscopy- Light microscopy, Phase contrast microscopy, Fluorescence microscopy, Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM).

**Electrophoresis-** Principle of electrophoresis, types of electrophoresis, factors affecting migration, staining in gel electrophoresis, application of electrophoresis.

**Centrifugation-** Principle of centrifugation, Types of centrifuge, Types of rotors, Caring of rotors, Determination of centrifugal force, Sedimentation of cellular organs.

**Spectrophotometry-** Principle, Functioning and application of colorimetry, UV-Vis spectrophotometry, fluorimetry and atomic absorption spectrophotometry.

**Microtomy and Histology-** Handling of tissues for pathological studies, Rotary microtome and its working, Fixation and Staining, Histological localization and its significance.

Course Code RTPCLA1	Credit-1	Marks 100
Laboratory course (Based on RTPCTA1)		

**Laboratory exercises:**

- Microscopic observations of Biological materials.
- Separation of biological material using Centrifuge, paper chromatography and electrophoresis.
- Biochemical analysis of samples using spectrophotometer.
- Microtomy and preparation of permanent mounts.

**Reference Books**

Techniques in Microscopy and Cell Biology- VK Sharma  
Stereo, Image processing and Quantitative Image Analysis in Biochemical Research- Shashi Wadhawa and Amit Dinda  
Introduction to Electron Microscopy III<sup>rd</sup> Ed.-Soul Wischnitzer.  
An introduction to Electrophoresis- K Anbalagan  
Electrophoresis- Smith.

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Instrumental Method of Chemical Analysis- BK Sharma  
Principles and Techniques of Practical Biochemistry- Keith Wilson and John Walker  
Laboratory Techniques- Swaroop and Pathak.  
Instrumental Analysis for Science and Technology-W Faren  
Instrumental Method of Analysis- Willard Merritt, Dean and Settle

M.Sc. III SEMESTER		
Course Code: RTPCSA1	Credit-1	Marks: 50
Course Title: SEMINAR		



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M.Sc. IV SEMESTER		
Course Code: RTPDTG1	Credit-4	Marks: 100
Course Title: COMPUTER APPLICATION		

**Learning outcomes**

On completion of the course, the students will be able to:

- Learn basics of Hardware and Software.
- Use the computer to prepare various documents.

Elementary knowledge of Computer, Characteristic of computers, Classification of Computers, functions and application, Limitations of computers.

Types of computers, Types of Processors, Input and Output Devices, Memory, volatile and non volatile and cache memory

Hardware and its component, software, network and network topology, Mesh network, star network, ring network, bus network.

Application- MS office: Creating, Editing and saving files; Use of inbuilt Statistical and other functions, Internet, email, video conferencing, e-learning, Edusat, power point presentation.

Computer Applications for Rural Development, constraints, Role of computer education in Rural Development.

**Reference Books:**

Computer organization and design-Pal Chaudhuri  
Computer organization-4th Edition Raja Raman  
Fundamental of Computers and multimedia-Mukharjee  
Fundamental of Graphics-3rd edition Bala Guru samy  
Programming in Basic-3rd edition John. D. Deans  
A Rural Computer consulting Business : John. D. Deans

M.Sc. IV SEMESTER		
Course Code: RTPDTG2	Credit-4	Marks: 100
Course Title: ENTREPRENEURSHIP		

**Learning outcomes**

On completion of this course, the students will be able to:

- Understand entrepreneurship and qualities of an entrepreneur.
- Start SSI/ cottage industries along with the various sources of financial support.

Entrepreneurship- Meaning, Definition, Factors stimulating Entrepreneurship, Phases of Entrepreneurship Development, factors affecting Entrepreneurship growth, Entrepreneurial behavior, International Entrepreneurship- meaning, Difference between domestic and International Business.

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Semester-wise syllabus for PG Course

Entrepreneurship Development in India- History, Entrepreneurship development Programme, Importance of Entrepreneurship Development, Object of EDP, Phases of EDP, Problems.

Women Entrepreneurship-Concept, Factors Influencing of Women Entrepreneurship, Male vs. Women Entrepreneurs, Problems of Women Entrepreneurs, Remedial Measures, Scope and Opportunities for Women Entrepreneurs.

Starting a MSME- Business idea, Preparation of Preliminary Project Report, Detailed Project Report, Location, Apply for Registration, Apply for loan, Apply for subsidy, place order for Machinery, Arrangement of Power, Insurance, Government Clearance, Procurement of Raw Material.

Start Ups- Introduction, Start-up Initiatives by Government, Mentors, Accelerators, Incubators, Sources of Finance for start-ups, Failure, Strategies for Success, Start-Up Innovation in India. Forms for ownership Sole Proprietorship, partnership, co-operative organization.

**Reference Books:**

M.B. Shukla : Entrepreneurship and Small Business Management, Kitab Mahal  
S.S. Kanka: Entrepreneurial Development  
Prasanna Chandra: Project Planning, Analysis, Selection, Implementation and Review  
Tata McGraw Hill.  
Vasantha Desai: Dynamics of Entrepreneurial Development  
C.B. Gupta & N.P. Sreenivasan: Entrepreneurial Development  
Nirmal K. Gupta: Small Industry - Challenges and Perspectives

**M. Sc. IV SEMESTER**

Subject Code: RTPDDCI	Credit-15	Marks: 400
(Thesis Evaluation 300+ Viva-voce 100)		
Dissertation		

Dissertation must be compulsory for all students. Students will have liberty to complete his/her dissertation work either in the Department or any other Department or Institution. If student desires to complete his/her dissertation work outside the Department, he/she will have bear all expenses.

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