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List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	Yellow	



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

Department : Botany


Programme Name : B.Sc. (Hon's)

Academic Year : 2018-19

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	LS/BOT/SEC301	Bio-fertilizers
02.	LS/BOT/SEC302	Herbal Technology
03.	LS/BOT/SEC401	Medicinal Botany
04.	LS/BOT/SEC402	Mushroom Culture Technology
05.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
06.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
07.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
08.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
09.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
10.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX

Scheme and Syllabus Attached


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Signature & Seal of HoD
विभागाध्यक्ष
Head

वनस्पति शास्त्र विभाग
Department of Botany
गुरु घासीदास विश्वविद्यालय (केन्द्रीय वि.वि.), बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (C.G.)

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**Proposed syllabus
for
UG (Hon's) BOTANY
based on**

**CHOICE BASED CREDIT SYSTEM
(Three year/six semesters)**

B.Sc. BOTANY HONOURS

To be implemented from the academic session 2018-2019

**Department of Botany
School of Life Science
GURU GHASIDAS VISHWAVIDYALAYA
Koni, Bilaspur (CG)
B.Sc. (BOTANY) Hon's**

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Preamble

Today plant science is a fusion of the traditional components with the modern aspects of biochemistry, molecular biology and biotechnology. Over the years, plant science (Botany) has shown enormous gain in information and applications owing to tremendous inputs from research in all its aspects. With global recognition of the need for conservation, field plant biologists have contributed significantly in assessing plant diversity. Taxonomists have explored newer dimensions for the classification of plants. New insights have been gained in functional and structural aspects of plant development by utilizing novel tools and techniques for botanical research. Challenging areas of teaching and research have emerged in ecology and reproductive biology. Concern for ever increasing pollution and climate change is at its highest than ever before. Keeping these advancements in view, a revision of the curriculum at the undergraduate level is perfectly timed. From the beginning of 2014-15 session, the Botany students across Indian Universities shall have the benefit of a balanced, carefully-crafted course structure taking care of different aspects of plant science, namely plant diversity, physiology, biochemistry, molecular biology, reproduction, anatomy, taxonomy, ecology, economic botany and the impact of environment on the growth and development of plants. All these aspects have been given due weightage over the six semesters. It is essential for the undergraduate students to acquaint themselves with various tools and techniques for exploring the world of plants up to the sub-cellular level. A paper on this aspect is proposed to provide such an opportunity to the students before they engage themselves with the learning of modern tools and techniques in plant science. Keeping the employment entrepreneurship in mind, applied courses have also been introduced. These courses shall provide the botany students hands on experience and professional inputs. On the whole, the curriculum is a source of lot of information and is supported by rich resource materials. It is hoped that a student graduating in Botany with the new curriculum will be a complete botanist at Honours level.

Students should be encouraged to opt for at least 1 or 2 Generic Electives from other Life Sciences like Zoology/Biotechnology/Forensic Science/Anthropology and Chemistry courses.

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SCHOOL OF SCIENCES: (LIFE SCIENCE)
B.Sc. (BOTANY) Hon's

SEMESTER I

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week	End semester marks	Internal Marks	Total marks
Semester I	Core-1	LS/BOT/C-101L	Phycology and Microbiology	4	4	35	15	50
	Core-1 Practical	LS/BOT/C-101P	Practical based on core 1	2	4	35	15	50
	Core-2	LS/BOT/C-102L	Bio-molecules and cell Biology	4	4	35	15	50
	Core-2 Practical	LS/BOT/C-102P	Practical based on core 2	2	4	35	15	50
	Generic Elective-1 (GE- 1)	LS/BOT/GE-101L	Opted from the basket	4	4	35	15	50
	Generic Elective-1 Practical	LS/BOT/GE-101P	Practical based on GE-1	2	4	35	15	50
	Ability Enhancement Compulsory Course-1 (AECC)	LS/BOT/AE-101EC	English Communication	4*	4	35	15	50
	ECA	LS/BOT/ECA-101	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhita/ vocational Training/ Sports/ others	2	(2)	35	15	50
			TOTAL	24	28			400

SEMESTER II

Semester II	Core-3	LS/BOT/C-203L	Mycology and Phytopathology	4	4	35	15	50
	Core-3 Practical	LS/BOT/C-203P	Practical based on core 3	2	4	35	15	50

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	Core- 4	LS/BOT/C-204L	Archegoniate	4	4	35	15	50
	Core- 4 Practical	LS/BOT/C-204P	Practical based on core 4	2	4	35	15	50
	Generic Elective-2 (GE-1B)	LS/BOT/GE-202L	Elective from the Basket	4	4	35	15	50
	Generic Elective-2- Practical	LS/BOT/GE-202P	Practical based on GE-2	2	4	35	15	50
	Ability Enhancement Compulsory Course-2 (AECC)	LS/BOT/AE-202-ES	Environmental Science	4*	4	35	15	50
	ECA		ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)	35	15	50
			Total	24	28			400
	SUMMER Internship: 15 days	LS/BOT/SI-201	Swayam/ Swachhta / NSS / Industrial/ others	2	100	35	15	50
SEMESTER III								
Semester III	Core- 5	LS/BOT/C-305L	Anatomy of Angiosperm	4	4	35	15	50
	Core- 5 Practical	LS/BOT/CP-305P	Practical based on core 5	2	4	35	15	50
	Core- 6	LS/BOT/C-306L	Economic Botany	4	4	35	15	50
	Core- 6 Practical	LS/BOT/CP-306P	Practical based on core 6	2	4	35	15	50
	Core- 7	LS/BOT/C-307L	Genetics	4	4	35	15	50
	Core- 7 Practical	LS/BOT/CP-307P	Practical based on core 7	2	4	35	15	50

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	Generic Elective-3 (GEII-A)	LS/BOT/GE-303L	Elective from the Basket	4	4	35	15	50
	Generic Elective-3-Practical	LS/BOT/GEP-303P	Practical based on GE-3	2	4	35	15	50
	Skill Enhancement Course (SEC-1)	LS/BOT/SEC-301L	From the Basket	2	2	35	15	50
	Skill Enhancement Course (SEC-1) practical/Training/field visit	LS/BOT/SEC-301P	Based on the selected course	2	2	35	15	50
			Total	28	34			500

SEMESTER IV

Semester IV	Core- 8	LS/BOT/C-408L	Molecular Biology	4	4	35	15	50
	Core- 8 Practical	LS/BOT/C-408P	Practical based on core 8	2	4	35	15	50
	Core- 9	LS/BOT/C-409L	Plant Ecology and Phytogeography	4	4	35	15	50
	Core- 9 Practical	LS/BOT/C-409P	Practical based on core 9	2	4	35	15	50
	Core-10	LS/BOT/C-410L	Plant Systematics	4	4	35	15	50
	Core-10 Practical	LS/BOT/C-410P	Practical based on core 10	2	4	35	15	50
	Generic Elective- 4 (GEII-B)	LS/BOT/GE-404L	Elective from the Basket	4	4	35	15	50
	Generic Elective-4-Practical	LS/BOT/GE-404P	Practical based on GE-3	4	4	35	15	50
	Skill Enhancement Course (SEC -2)	LS/BOT/SEC-402L	From the SEC basket	2	2	35	15	50

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	Skill Enhancement Course (SEC-2) practical/Training/field visit	LS/BOT/SEC-402P	Based on the selected SEC course	2	2	35	15	50
			TOTAL	28	34			500
SUMMER Internship: 15 days								
SUMMER Internship: 15 days		LS/BOT/SI-402	Swayam Swachhta / NSS / Industrial/ others	2	100	35	15	50
SEMESTER V								
Semester V	Core-11	LS/BOT/C-511L	Reproductive Biology of Angiosperm	4	4	35	15	50
	Core -11 Practical	LS/BOT/CP-511P	Practical based on core 11	2	4	35	15	50
	Core -12	LS/BOT/C-512L	Plant Physiology	4	4	35	15	50
	Core -12 Practical	LS/BOT/CP-512P	Practical based on core 12	2	4	35	15	50
	Discipline Specific Elective (DSE-1)	LS/BOT/DSE-501AL LS/BOT/DSE-501BL	A) Analytical Technique in Plant Science B) Natural Resource Management	4	4	35	15	50
	DSE-1 - Practical	LS/BOT/DSE-501AP LS/BOT/DSE-501BP	Practical based on DSE-1	2	4	35	15	50
	Discipline Specific Elective (DSE-2)	LS/BOT/DSE-502AL LS/BOT/DSE-502BL	A) Biostatistics B) Bioinformatics	4	4	35	15	50
	DSE-2 - Practical	LS/BOT/DSE-502AP LS/BOT/DSE-502BP	Practical based on DSE-2	2	4	35	15	50
			TOTAL	24	32			400

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SEMESTER VI								
Semester VI	Core-13	LS/BOT/C-613L	Plant Metabolism	4	4	35	15	50
	Core -13 Practical	LS/BOT/CP-613P	Practical based on core 13	2	4	35	15	50
	Core -14	LS/BOT/C-614L	Plant Biotechnology	4	4	35	15	50
	Core -14 Practical	LS/BOT/CP-614P	Practical based on core 14	2	4	35	15	50
	Discipline Specific Elective (DSE-3)	LS/BOT/DSE 603AL LS/BOT/DSE 603BL	A) Industrial and Environmental Microbiology B) Plant Breeding	4	4	35	15	50
	DSE-3 - Practical	LS/BOT/DSE 603AP LS/BOT/DSE 603BP	Practical based on DSE-3	2	4	35	15	50
	Dissertation / Project work followed by seminar	LS/BOT/PD-601	Dissertation/ Project work followed by seminar	5 + 1 = 6	8	70	30	100
			TOTAL	24	32			400
		TOTAL CREDITS	152 + 4 (SI)					

1. Continuous Internal assessment should be evaluated by two components: Seasonal test + assignment
2. Marks distribution as proposed (70/30 ratio End semester/ continuous internal assessment) / According to the final ordinance

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Course offered by Botany

(Course Basket)

Generic Electives

1. Biodiversity (Microbes, Algae, Fungi and Archegoniate)
2. Plant Physiology and Metabolism
3. Economic Botany and Biotechnology
4. Environmental Technology

Discipline Specific Electives

1. Analytical Techniques in Plant Sciences
2. Bioinformatics
3. Plant Breeding
4. Natural Resource Management:
5. Industrial and Environmental Microbiology
6. Biostatistics

Ability Enhancement Course Compulsory

1. English/MIL Communication
2. Environmental Science

Skill enhancement course Elective

1. Bio-fertilizers
2. Herbal Technology
3. Medicinal Botany
4. Plant Diversity and Human Welfare
5. Mushroom Culture Technology
6. Intellectual Property Rights

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SKILL ENHANCEMENT COURSE

New Course

Biofertilizers

(Credits: Theory 2, Practical Training/ Field visit -2)

THEORY (Lectures: 30)

Unit 1: General account about the microbes used as biofertilizer - Rhizobium - isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.

(4 lectures)

Unit 2: *Azospirillum*: isolation and mass multiplication - carrier based inoculant, associative effect of different microorganisms. *Azotobacter*: classification, characteristics - crop response to *Azotobacter* inoculum, maintenance and mass multiplication.

(8 lectures)

Unit 3: Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

(4 lectures)

Unit 4: Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield - colonization of VAM - isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

(8 lectures)

Unit 5: Organic farming - Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes - biocompost making methods, types and method of vermicomposting - field Application.

(6 lectures)

Practical/ Training/Field visit

Based on Theory paper

Suggested Readings

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad

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SKILL ENHANCEMENT COURSE

New course

Herbal Technology

(Credits: Theory 2, Practical Training/ Field visit -2)

THEORY (Lectures: 30)

Unit 1:Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants. (6 Lectures)

Unit 2: Pharmacognosy - systematic position m edicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka. (6 Lectures)

Unit 3:Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; *Catharanthus roseus* (cardiotonic), *Withania somnifera* (drugs acting on nervous system), *Clerodendron phlomoides* (anti-rheumatic) and *Centella asiatica* (memory booster). (6 Lectures)

Unit 4:Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds) (8 Lectures)

Unit 5:Medicinal plant banks micro propagation of important species (*Withania somnifera*, neem and tulsi- Herbal foods-future of pharmacognosy) (4 Lectures)

Practical/ Training/Field visit

Based on Theory paper

Suggested Readings

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
4. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
5. Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
6. Principles of Ayurveda, Anne Green, 2000. Thomsons, London.
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

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SKILL ENHANCEMENT COURSE

Medicinal Botany

New course

(Credits: Theory 2, Practical Training/ Field visit -2)

THEORY (Lectures: 30)

Unit 1:

History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept; Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations. (10 Lectures)

New

Unit 2:

Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: (6 Lectures)

Repeater

Unit 3.

Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding. (4 Lectures)

Unit 4:

Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. (6 Lectures)

New

Unit 5

Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases. (4 Lectures)

Practical/ Training/Field visit

Based on Theory paper

Suggested Readings

1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.

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SKILL ENHANCEMENT COURSE

Mushroom Culture Technology

(Credits: Theory 2, Practical Training/ Field visit -2)

THEORY (Lectures: 30)

Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. (5 Lectures)

Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. (12 Lectures)

Unit 3: Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins. (8 Lectures)

Unit 4: Food Preparation : Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value. (5 lectures)

Practical/ Training/Field visit

Based on Theory paper

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

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