

DEPARTMENT OF BOTANY
NALLAMUTHU GOUNDERMAHALINGAM COLLEGE
(AUTONOMOUS)
POLLACHI – 642 001

Batch 2017-2020

SYLLABUS
(CBCS &
Outcome Based Education)

FOR
B.Sc., BOTANY
AND
ALLIED ZOOLOGY
&
SCHEME OF EXAMINATION
(FOR B.Sc., BOTANY)

REVISED ON THE BOARD OF STUDIES
HELD ON MARCH 2017

NGM College

Vision

Our dream is to make the college an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

Department of Botany

Vision

The Department of Botany aims to achieve high quality education and research relevant to local, regional and national needs and through knowledge sharing with leading researchers and educators across the country. We foster an exciting and intellectually stimulating atmosphere for all in a co-operative and positive environment.

Mission

To bring confidence in the lifestyle of any Botany student whose stay will ensure proficiency and competency in the subjects thought. We inculcate the habit of excellence in all the learning activities so as to ensure employability.

Programme Objectives

1. To impart quality education to meet the demands of higher education and Research in Botany
2. To develop a competitive edge among the students to meet out their employability

Programme Outcomes

- PO1 To appreciate and understand the diversity of cellular forms, lower plants to higher Plants
- PO2 To introduce the theoretical knowledge and basic concepts on Biomolecules, Microbes, Plant Structure, Function and Evolution
- PO3 To get hands-on training and practical knowledge in the preparation of microsections, herbarium, quantifying biomolecules and other basic techniques
- PO4 To create interest in identification of plants using Floral characters, genetic traits and molecular markers
- PO5 To update the students with modern trends in Plant biology and introduce the interdisciplinary approach

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI.

DEPARTMENT OF BOTANY

B.Sc., BOTANY

SCHEME OF EXAMINATION (FOR I -VI SEMESTERS)

(FOR CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2017-2020 BATCH)

(CBCS for under graduate programmes with language for 4 semesters)

Part No	Course Code	Course title	Lecture+ Tutorial/ Practical Hours/ week	Duration of Exam Hrs	Max. Marks			Credit Point
					Internal	End-of-Semester	Total	
	Semester I							
I	17UTL101	Tamil/Hindi Paper – I	6	3	25	75	100	3
II	17UEN101	English Paper – I	5	3	25	75	100	3
III	17UBY101	Major Paper I - Plant Diversity I (Phycology, Mycology and Bryology)	9	3	25	75	100	4
	17UZY1A1	Allied - Paper I Zoology	7	3	25	75	100	3
IV	17UHR101	Human Rights	1	2	-	50	50	2
	17HEC101	Human Excellence - Personal values & SKY yoga practice- I	2	2	25	25	50	1
V		Extension Activities (NSS, NCC, Sports & Games)						
	500							16
	Semester II							
I	17UTL202	Tamil/ Hindi Paper – II	6	3	25	75	100	3
II	17UEN202	English Paper – II	5	3	25	75	100	3
III	17UBY202	Major Paper II Plant Diversity II (Pteridophytes Gymnosperms and Palaeobotany)	6	3	25	75	100	4
	17UBY203	Major Practical I – Paper III (Plant diversity I & II (Phycology, Mycology and Bryology & Pteridophytes Gymnosperms and Palaeobotany)	2	3	40	60	100	4
	17UZY2A2	Allied - Paper II Zoology	7	3	25	75	100	3
	17UZY2A3	Allied - Paper III Practical	2	3	40	60	100	4
IV	17EVS201	Environmental Studies	2	2	-	50	50	2
	17HEC202	Human Excellence - Family values & SKY yoga practice- II	2	2	25	25	50	1
V		Extension Activities (NSS, NCC, Sports & Games)						
	700							24

	Semester III							
I	17UTL303	Tamil/ Hindi Paper – III	5	3	25	75	100	3
II	17UEN303	English Paper – III	6	3	25	75	100	3
III	17UBY304	Major Paper IV- Cytology, Anatomy and Embryology	9	3	25	75	100	4
	17UCY3A4	Allied Paper IV - Chemistry	8	3	25	75	100	3
IV	17UBY3N1/ 17UBY3N2	Skill based subjects (Non major electives)- Landscape designing/ Herbal cosmetics *Basic Tamil paper I	1	2	-	50	50	2
	17HEC303	Human Excellence - Professional values & SKY yoga practice- III	2	2	25	25	50	1
V		Extension Activities (NSS, NCC, Sports & Games)						
	50016							
	Semester IV							
I	17UTL404	Tamil/ Hindi Paper – IV	5	3	25	75	100	3
II	17UEN404	English Paper – IV	6	3	25	75	100	3
III	17UBY405	Major Paper V – Biophysics and Biochemistry	6	3	25	75	100	4
	17UBY406	Major Practical II - Paper VI (Cytology, Anatomy &Embryology &Biophysics and Biochemistry)	2	3	40	60	100	4
	17UCY3A5	Allied - Paper V- Chemistry	6	3	25	75	100	3
	17UCY3A6	Allied paper VI – Chemistry Practical	2	3	40	60	100	4
IV	17UBY4N3/ 17UBY4N4	Skill based subjects (Non major electives)- (Remote sensing and natural resource management/ Bioinformatics) *Basic Tamil paper II	1	2	-	50	50	2
	17HEC404	Human Excellence – Social values & SKY yoga practice- IV	2	2	25	25	50	1
V	17UNC401/ 17UNS402/ 17USG403	NCC/ NSS / Sports and Games				50		501
	75025							

	Semester V							
III	17UBY507	Major Paper – VII - Taxonomy of Angiosperms	6	3	25	75	100	4
	17UBY508	Major Paper VIII - Genetics and evolution	5	3	25	75	100	4
	17UBY509	Major Paper IX – Microbiology and plant pathology	5	3	25	75	100	4
	17UBY510	Major Paper X – Genetic Engineering	5	3	25	75	100	4
	17UBY511	Elective -I Mathematics for Biologists	5	3	25	75	100	5
IV	17UBY5S1/ 17UBY5S2	Skill based subjects (Major electives)- Microscopic techniques/ Mushroom cultivation	1	2	-	50	50	2
	17GKL501	General Knowledge & General Awareness (SBE)	SS	2	-	50	50	2
	17HEC505	Human Excellence - National values & SKY yoga practice- V	2	2	25	25	50	1
	650							26
	Semester VI							
III	17UBY612	Major Paper XII – Plant Physiology	6	3	25	75	100	4
	17UBY613	Major Paper XIII – Economic & Ethnic Botany	5	3	25	75	100	4
	17UBY614	Major Paper XIV - Plant Biotechnology	5	3	25	75	100	4
	17UBY615	Elective II – Bioinformatics&Cyberse curity	5	3	25	75	100	5
	17UBY616	Elective – III – Habitat Ecology	5	3	25	75	100	5
	17UBY617	Major Practical III – Paper XV (for V Sem theory papers)	2	3	40	60	100	4
	17UBY618	Major Practical IV (for VI Sem theory papers)	2	3	40	60	100	4
IV	17UBY6S3 17UBY6S4	Skill based subjects (Major electives)- Horticulture & Plant breeeing/ Biofarming	1	2	-	50	50	2
	17HEC606	Human Excellence - Global values & SKY yoga practice- VI	2		25	25	50	1
	800							33
	**Grand total							3900140

* The credits given are applicable only to the students who opt for Basic Tamil paper and the credits for Human Excellence papers cannot be given to them.

****Grand total should be equal/below 3900 (For UG Programmes); 2550 (For PG Programmes)**
SS – Self study, SBE – Skill Based Elective, NME–Non Major Elective

Bloom's Taxonomy Based Assessment Plan
PART I, II& III

Bloom's Taxonomy Section	Knowledge Level	Internal Section : 25	Mark	Description	External : 75 Total
		Section-A			
K	K1	1-5	5X1	MCQ(One question from each unit)	5
	K1	6-10	5X1	Short answers (One question from each unit)	5
		Section-B			
U	K2	11-15	5X5	Short answers Either/ Or type (One question from each unit)	25
		Section-C			
A	K3	16-21	4X10	Detailed Four out of six (Question no.16 is compulsory)	40
			17-21 Answer any three		Total : 75

Bloom's Taxonomy Section	Knowledge level	Section	Pattern	External : 50	
				Mark	Total
K	K1	Part A	1-5 Multiple choice with 4 options	5X1	5
U	K2		6-10 Short answers (One question from each unit)	5X1	5
A	K3	Part B	Open choice (5 out of 8 Questions)	5X8	40
			Total :		50

- Communicative English and General Awareness papers include 60% objective type of questions and 40% descriptive type of questions
- GK 100% objective type of questions (online exam)
- The marks and credits for Extension activities are given by the concerned departments

SYLLABUS

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY101 Title : PLANT DIVERSITY I (PHYCOLOGY, MYCOLOGY AND BRYOLOGY)		Semester: 1
Hrs/Week :	5	Credit: 4
Course Objective	To understand the morphology, structure, life cycle of the selected forms of Algae, Fungi, Lichens and Bryophyte . To appreciate the diversity of lower plants	

Course Outcome

K1	CO1	To differentiate lower plants like Algae, Fungi, Lichens and Bryophytes
K2	CO2	To understand the morphology and lifecycle of Algae, Fungi, Lichens, Bryophyte
K3	CO3	To apply different classification systems to appreciate the diversity of lower plants
K4	CO4	To identify the economically important Algae, Fungi, Lichens and Bryophytes

Unit	Content	Hrs
Unit I	General characters of algae - Classification of algae (Fritsch) – Distribution, structure, reproduction and life cycle of the following: Cyanophyceae (<i>Oscillatoria</i>), Chlorophyceae (<i>Oedogonium</i>) and Phaeophyceae (<i>Sargassum</i>).	13
Unit II	Distribution, structure, reproduction and life cycle of the following: Rhodophyceae (<i>Polysiphonia</i>) and Bacillariophyceae (<i>Cyclotella</i> & <i>Pinnularia</i>) - *Economic importance of algae.	13
Unit III	General characters of Fungi - Mode of nutrition - Classification of Fungi (Alexopoulos, 1972) - *Economic Importance of Fungi - Structure, reproduction and life cycle of Zygomycetes- <i>Mucor</i> , Ascomycetes - Yeasts	13
Unit IV	Structure, reproduction and life cycle of Basidiomycetes - <i>Puccinia</i> and <i>Ustilago</i> . Lichens: Occurrence, Morphology, structure, Reproduction and Economic importance.	13
Unit V	General characters and classification of Bryophytes (Reimers), Distribution, structure, development and reproduction of <i>Riccia</i> , <i>Anthoceros</i> and <i>Polytrichum</i> .	13

**Self study topics*

Text Books:

1. Smith, G.M., 1971. Cryptogamic Botany Vol. I Algae & Fungi. Tata McGraw Hill Publishing Co., New Delhi.
2. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
3. Sharma O.P. 1992. Text book of Thallophytes. McGraw Hill Publishing Co., New Delhi.

Reference Books:

4. Sharma P. D. 1991. The Fungi, Rastogi & Co., Meerut
5. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. I & II, New central book agency, Calcutta.
6. Dube H. C. 1990. An introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	L
CO2	H	H	M	H	L
CO3	H	H	M	H	L
CO4	H	H	M	H	L

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Zoology	Effective from the Year: 2017
Subject Code : 17UZY1A1 Title : ANCILLARY BOTANY PAPER - I (PLANT DIVERSITY, ANATOMY, EMBRYOLOGY AND PLANT PATHOLOGY)		Semester: 1
Hrs/Week :	6	Credit: 3
Course Objective	To appreciate the diversity in lower plants To understand the anatomy of angiosperms To know the embryo development and fertilization in higher plants To teach important plant diseases, causal organisms and control.	

Course Outcome

K1	CO1	To recollect the existing diversity among lower plants
K2	CO2	To understand the internal structure and embryology of angiosperms
K3	CO3	To analyze the economically important plant diseases and their control measures
K4	CO4	To obtain the skill of technically draw the plant tissues

Unit	Content	Hrs
Unit I	Structure, life history and *economic importance of the following types: Algae: <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi: <i>Penicillium</i> and <i>Agaricus</i> , Lichens.	16
Unit II	A brief account of the structure, reproduction and life cycle of the following genera (excluding development of sex organs): Bryophyte: <i>Riccia</i> , Pteridophyte: <i>Lycopodium</i> and Gymnosperm: <i>Cycas</i> .	16
Unit III	Simple tissues – parenchyma, collenchyma and sclerenchyma - complex tissues – xylem and phloem - cambium – primary structure and secondary structure of dicot stem.	15
Unit IV	Anther structure – ovule structure – 8-nucleate embryo sac – double fertilization – endosperm (nuclear and cellular) – structure of dicot and monocot embryos (development excluded) – parthenocarpy.	15
Unit V	Study of plant diseases - viral disease (TMV) - bacterial disease (citrus canker) - fungal disease (red rot of sugarcane) – plant *disease control – physical, chemical and biological methods.	15

**Self study topics*

Power point Presentations, Seminar ,Quiz, Assignment,

Text Books:

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rdEdn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Susil Kumar Mukerjee, 1984. College botany, Vol.III. New Central Book agency, Calcutta.
3. Jain, V.K., 1974. Fundamentals of plant physiology, 6thEdn., S. Chand & Company Ltd., New Delhi.

Reference Books:

4. George, H.M., Lawrence, 1958. Taxonomy of vascular plants. The Macmillan Company, Newyork.
5. Pandey, B.P. 1997. Economic botany, C. Chand & Company Ltd., New Delhi.
6. Salisbury, F.B. and Rose, 1986. Plant physiology, 3rdEdn, C.B.S. Publishers, New Delhi.
7. Kumar, N., Abdul Khader, JBM., M.D. Rangaswami, P. and I.Irullappan, 1993. Introduction to species, Plantations crops, Medicinal and aromatic plants, Rajalakshmi publication, Nagercoil, Tamilnadu, India.
8. Wallils, T.E.,1985. Text book of pharmacognosy, 5thEdn. CBS publishers & distributors, Delhi.
9. Kumaresan, V., 1998. Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
10. Ignacimuthu, S.,1996. Applied Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.

CO \ PSO	PSO	PS01	PS02	PS03	PS04	PS05
C01		H	S	H	H	L
C02		H	S	H	H	M
C03		H	S	M	H	M
C04		H	S	H	H	M

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	

SYLLABUS

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY101 Title : PLANT DIVERSITY II (PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY)		Semester:2
Hrs/Week :	5	Credit: 4
Course Objective	To study the morphology and life cycle of selected Pteridophytes, Gymnosperms To learn the concept of evolution and paleobotany	

Course Outcome

K1	CO1	To appreciate the morphology and lifecycle of Algae, Fungi, Lichens, Bryophyte
K2	CO2	To understand the concepts of evolution, Paleobotany and evolution of land plants
K3	CO3	To identify the economically important Pteridophytes and Gymnosperms
K4	CO4	To analyse the fossil slides and specimen

Unit	Content	Hrs
Unit I	General characters and classification of Pteridophytes (Reimers) - stelar evolution - heterospory and origin of seed habit - structure and reproduction of Glyheniya and Lycopsida(<i>Lycopodium</i>)	13
Unit II	Structure and reproduction of Sphenopsida (<i>Equisetum</i>) and Pteropsida(<i>Selaginella</i>). * Economic importance of Pteridophytes.	13
Unit III	General characters and classification of Gymnosperms (Sporne, 1965) - structure development and reproduction of <i>Cycas</i> .	13
Unit IV	Structure development and reproduction of <i>Gnetum</i> . * Economic importance of Gymnosperms.	13
Unit V	Palaeobotany-Geological time scale –fossils-fossilisation and kinds of fossils -detailed study of <i>Lepidodendron</i> , <i>Lepidocarpon</i> <i>Lepidostrobus</i> , <i>Lepidophylla</i> and <i>Williamsonia</i> .	13

**Self study topics*

Power point Presentations, Seminar ,Quiz, Assignment,

Text Books :

1. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
2. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rd Edn. College Botany Vol. II, New central book agency, Calcutta.

3. Sporne K.R. 1991. The morphology of Gymnosperms. B.I. Publications Pvt. Bombay Calcutta, Delhi.

Reference Books:

4. Sharma O.P. 1992. Text book of Pteridophyta, Macmillan India Ltd., New Delhi.
5. Wilson, N.S. and Rothwell, G.W. 1993. Palaeobotany and the evolution of plants (2nd edition), Cambridge University Press, UK.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	L	M	L
CO2	S	H	L	M	L
CO3	S	H	L	M	L
CO4	S	S	L	M	L

S-Strong; H-High; M-Medium; L-Low

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Dr.M.Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY203 Title : MAJOR PRACTICAL - I (PLANT DIVERSITY I & II)		Semester: 2
Hrs/Week :	2	Credit: 4
Course Objective	To get hands on knowledge on microbial culture techniques To understand the plant diversity, thallus construction of selected forms To learn about the fossilized plant forms and Plant evolution.	

Course Outcome

K1	CO1	To revise the morphology and reproductive structures in Algae, Fungi, Lichens, and Bryophyte
K2	CO2	To get the picture of internal structures and spore bearing parts of selected plant forms
K3	CO3	To compare the life cycles of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms
K4	CO4	To prepare microsections and to professionally draw plant sketches, to identify fossil specimen and slides

Unit	Content	Hrs
Unit I	A detailed study of thallus organization and reproductive structures of the following forms: Algae – <i>Oscillatoria</i> , <i>Oedogonium</i> , <i>Sargassum</i> , <i>Polysiphonia</i> , <i>Cyclotella</i> and <i>Pinnularia</i> . Fungi - <i>Mucor</i> , Yeasts, <i>Puccinia</i> and <i>Ustilago</i> . Lichen – <i>Usnea</i> .	5
Unit II	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Bryophytes - <i>Riccia</i> , <i>Anthoceros</i> and <i>Polytrichum</i> .	5
Unit III	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Pteridophytes - <i>Glyheniya</i> , <i>Lycopodium</i> , and <i>Selagenella</i> .	5
Unit IV	A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera: Gymnosperms - <i>Cycas</i> and <i>Gnetum</i> .	6
Unit V	A detailed study of the following fossil genera <i>Lepidodendron</i> , <i>Lepidocarpon</i> , <i>Lepidostrobus</i> , <i>Lepidophylla</i> and <i>Williamsonia</i> from fossil specimen/parts or slides.	6

Preparing microsections and mounting, Spotters, Specimen, Slides, Power point Presentations,

CO \ PSO	PS01	PS02	PS03	PS04	PS05
C01	S	M	S	H	L
C02	S	M	S	H	L
C03	S	M	S	H	L
C04	S	M	S	H	L

S-Strong; H-High; M-Medium; L-Low

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Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	
Dr.K.Rajalakshmi			

Department	Botany	
Course	B.Sc., Zoology	Effective from the Year: 2017
Subject Code : 17UZY2A2 Title : ANCILLARY BOTANY PAPER - II (TAXONOMY OF ANGIOSPERMS, PHYSIOLOGY, HORTICULTURE, MEDICINAL BOTANY & PLANT BIOTECHNOLOGY)		Semester: 2
Hrs/Week :	6	Credit: 3
Course Objective	To appreciate the diversity in flowering plants To understand the physiology of angiosperms To learn the available horticultural techniques to raise new plantlets To study the selected medicinal plants and popular drugs from them To understand the basics of plant biotechnology	

Course Outcome

K1	CO1	To appreciate the morphology and lifecycle of selected Angiosperms
K2	CO2	To understand the concepts of Plant functions, Plant propagation, Plant tissue culture
K3	CO3	To identify flowering plants and medicinal plants in their habit.
K4	CO4	To know-how different cutting, layering, grafting, budding methods to propagate different plants

Unit	Content	Hrs
Unit I	Vegetative and floral characters and Economic importance of Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.	16
Unit II	Photosynthesis – A brief account of light and dark reactions with reference to C3 plants – respiration – glycolysis, krebs cycle, oxidative phosphorylation – growth regulators – auxins, gibberellic acid and ABA.	16
Unit III	Horticulture: Seed propagation- asexual propagation and its advantages – cutting, layering, grafting and budding – *hydroponics – bonsai.	15
Unit IV	Pharmacognosy – definition and history – drugs obtained from algae (<i>Spirulina</i>), fungi (<i>Penicillium</i>), gymnosperms (<i>Ginkgo</i>) and angiosperms (<i>Rauwolfiaserpentina</i> and <i>Phyllanthusamarus</i>) – nutraceuticals.	15
Unit V	Plant Biotechnology – plant tissue culture: totipotency – micropropagation – meristem culture – Transgenesis – Genetically modified food (Bt cotton and *Golden rice).	15

**Self study topics*

Power point Presentations, Seminar ,Quiz, Assignment,

Text Books:

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3rdEdn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Bhojwani, S.S. and Bhatnagar, S.P., 2009. The embryology of angiosperms, Vikas publishing house pvt Ltd., New Delhi.
3. Pandey, B.P., 1987. Plant anatomy, 4thEdn., S. Chand & Company, New Delhi.

Reference Books:

4. Gilbert, M. Smith, 1972. Cryptogamic botany: Algae and Fungi, Vol I. 2ndEdn. Tata McGraw Hill Publishing Ltd., New Delhi.
5. Krishnamoorthy, K.V. and K.N. Rao, 1984. Angiosperms, Viswanathanprinterspvt Ltd., Chennai.
6. Hirendra Chandra Gangulee and Ashok Kumar Kar, 1970. College Botany Vol II. New Central Book Agency, Calcutta.
7. Katherine Esau, 1953. Plant anatomy, 2ndEdn, Wiley Eastern pvt. Ltd., New Delhi.
8. Vashishta, P.C., 1997. Botany for degree students – Pteridophytes Part IV, S. Chand & Company Ltd., New Delhi.
9. Reinert J. and Bajaj, Y.P.S., 1988. Applied and Fundamental aspects of Plant cell and tissue organ culture, Narosa Publishing house, New Delhi.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	S	L
CO2	M	S	M	M	M
CO3	S	H	M	S	M
CO4	L	M	H	M	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	
Dr.K.Rajalakshmi			

Department	Botany	
Course	Zoology	Effective from the Year: 2017
Subject Code :17UZY2A3 Title : ANCILLARY BOTANY PRACTICAL		Semester: 2
Hrs/Week :	2	Credit: 4
Course Objective	To know the diversity, morphology, anatomy and reproductive structures of selected lower plants and higher plants. To impart the basic plant breeding, horticultural techniques and plant diseases. To introduce important medicinal plants and principles of plant biotechnology.	

Course Outcome

K1	CO1	To recollect some selected lower plants and higher plants in their habit
K2	CO2	To understand the internal structure, embryology and physiology of angiosperms
K3	CO3	To analyze the economically important plant diseases and their control measures
K4	CO4	To prepare microsections and obtain the skill of technically draw the plant tissues
K5	CO5	To propagate plants using simple horticultural techniques

Unit	Content	Hrs
Unit I	Plant Biodiversity Algae- <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi- <i>Penicillium</i> and <i>Agaricus</i> , Lichens - <i>Usnea</i> , Bryophyte - <i>Riccia</i> , Pteridophyte - <i>Lycopodium</i> and Gymnosperm - <i>Cycas</i> , Symptoms and causal organisms and control measures of TMV, citrus canker and red rot of sugarcane.	6
Unit II	Plant Anatomy and Embryology Parenchyma, collenchyma, sclerenchyma, xylem and phloem. Primary structure of dicot stem (<i>Tridax</i>), secondary structure of dicot stems (<i>Tridax</i> and <i>Polyalthia</i>). Permanent slides - structure of anther, ovule, embryo sac and embryo.	6
Unit III	Taxonomy of Angiosperms A detailed study of the following families: Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.	5
Unit IV	Plant Physiology (Demonstration) Photosynthesis - test tube and funnel experiment and light screen experiment Respiration – Ganong's respiroscope (aerobic) and Kuhns fermentation (anaerobic). Horticulture: Charts on cutting, layering and grafting.	5
Unit V	Medicinal Botany & Plant Biotechnology Study of following medicinal plants: <i>Spirulina</i> , <i>Penicillium</i> , <i>Ginkgo</i> , <i>Rauwolfia serpentina</i> and <i>Phyllanthus amarus</i> . Plant biotechnology charts.	5

Preparing Herbarium, Slides, Demonstrations, Simple experiments using apparatus, Power point Presentations,

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	S	M	M	S	M
C02	S	L	H	S	M
C03	S	M	S	H	M
C04	S	L	S	H	H
C05	M	M	H	H	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel		Dr.M.Durairaju	
Dr. K. Rajalakshmi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY304 Title : CYTOLOGY, ANATOMY AND EMBRYOLOGY		Semester: 3
Hrs/Week :	5	Credit: 4
Course Objective	To learn the ultrastructure of prokaryotic, eukaryotic cells and organelles To acquire knowledge about the entire plant growth and development. To know various anatomical features of flowering plants To understand the important events in embryo development and fertilization.	

Course Outcome

K1	CO1	To recollect the details about Plant cell, organelles, and their functions
K2	CO2	To understand the theories on Plant growth and development
K3	CO3	To analyze the internal structure and embryology of angiosperms
K4	CO4	To compare the growth and developmental pattern of dicots and monocots

Unit	Content	Hrs
Unit I	Cell biology: Ultra structure of prokaryotic and eukaryotic cells. Structure and functions of cell wall –plasma membrane – chloroplast - mitochondria – endoplasmic reticulum.	13
Unit II	Structure and functions of ribosomes - dictyosomes - nucleus - nucleolus – chromosomes: giant chromosomes:polytene and lamp brush- mitosis.	13
Unit III	Anatomy: Shoot apical meristem – theories - *Simple and complex tissues – cambium and its functions – types of vascular bundles – primary structure of monocot and dicot stem – normal secondary thickening in dicot stem – anomalous secondary growth in dicot stem (<i>Boerhaavia</i>) and monocot stem (<i>Dracaena</i>) – Wood structure (sap wood & heart wood) – dendrochronology.	13
Unit IV	Internal structure of monocot (Grass) and dicot (<i>Tridax</i>) leaves.Roots: primary structure of monocot and dicot roots – secondary growth in dicot root - anomalous secondary growth in dicot root(<i>Achyranthes</i>).	13
Unit V	Embryology: Flower: Structure and development – microsporangium-microsporogenesismegasporeangium and megasporogenesisPolygonum type) – ovules – pollination – double fertilization – types of endosperm – dicot (<i>Capsella</i>) and monocot	13

	(Najas) embryos – polyembryony – *parthenocarpy.	
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**Self study topics*

Charts, Powerpoint presentation, Seminar, Quiz, Assignment
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Text Books:

1. Verma P.S. and Agarwal, 2001. Cell biology. S. Chand & Company, New Delhi, India.
2. Bhojwani S.S. and Bhatnagar, S.P., 2000. The embryology of angiosperms. 4th edition, Vikas printing houses, New Delhi.
3. Esau K. 1977. Anatomy of seed plants. 2nd edition. John Wiley & Sons, New York.
4. Vashista P.C., 1997. Plant Anatomy, S. Chand & Co., New Delhi.

Reference Books:

5. De Robertis E.D.P., and De Robertis, E.M.F., 1995. Cell and molecular biology, 8th edn. BI. Waverly Pvt. Ltd., New Delhi.
6. Alberts B., Bray, D., Lewis, J. Raff, M. Roberts, K. and Watson, J.D., 1998. Molecular biology the cell. 2nd edn., Garland Pub. Inc., New Delhi.
7. Fahn A., 1974. Plant Anatomy, 2nd edition. Pergamon Press, Oxford.
8. Pandey B.P., 1985. Plant Anatomy, S and Chand & Co., New Delhi.
9. Maheswari P., 1971. An introduction to embryology of angiosperms. Tata McGraw Hill Publishing Co., New Delhi.
10. Swamy B.G.L. and Krishnamurthy, K.V., From flower to fruit, Tata McGraw Hill Publishing Co., New Delhi.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	H	L
CO2	M	S	L	M	M
CO3	M	S	L	L	L
CO4	M	H	M	H	M

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	
Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY3N1 Title : SKILL BASED ELECTIVE (NON MAJOR): LANDSCAPE DESIGNING		Semester: 3
Hrs/Week :	1	Credit: 2
Course Objective	To introduce the scope and essential elements of landscape. To learn various garden structures.	

Course Outcome

K1	CO1	To revisit the Gardening types and features
K2	CO2	To understand the Landscape designing principles
K3	CO3	To analyze the uniqueness of indoor garden
K4	CO4	To create interest in making flower arrangements, kitchen garden and terrarium

Unit	Content	Hrs
Unit I	Landscape designing – principles and categories of landscaping - Important ornamental plants – habit and types.	3
Unit II	Gardening – indoor garden: hanging baskets and terrarium – layout and importance of kitchen garden – public garden and its components.	3
Unit III	Garden features-Lawn: layout – preparation of land – propagation – irrigation – weeding – after care.	2
Unit IV	Glass house: applications and advantages - rockery – water garden – topiary- bonsai.	2
Unit V	Flower arrangement - cut flowers- Role of botanical garden-exsitu, insitu conservation.	2

Text Books:

1. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
2. Mani Bhusan Rao, 1964. Text book of Horticulture. Macmillan India Ltd., New Delhi.
3. Pratibhatrivedi, 1996. Home Gardening. Indial Council of Agricultural Research, New Delhi.

Reference Books:

4. George Acquaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
5. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.
6. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

Powerpoint presentation, Discussion, Demonstration
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CO \ PSO	PS01	PS02	PS03	PS04	PS05
C01	S	S	S	S	S
C02	H	H	H	H	H
C03	H	H	H	M	H
C04	S	H	S	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY3N2 Title : SKILL BASED ELECTIVE (NON MAJOR) – HERBAL COSMETICS		Semester: 3
Hrs/Week :	1	Credit: 2
Course Objective	To understand the role of herbs as a source of natural and safe cosmetics.	

Course Outcome

K1	CO1	To recollect the medicinal herbs and the need for herbal cosmetics
K2	CO2	To comprehend the principles behind herbal cosmetics
K3	CO3	To analyze the various personal care remedies using herbs
K4	CO4	To expose the students to prepare home recipes with available herbs

Unit	Content	Hrs
Unit I	Herbal cosmetics – introduction – principles – definition – history – need – advantages- disadvantages.	3
Unit II	Herbal skin and hair care – faceglow-dark circle remover-tools – ingredients – recipes	3
Unit III	SPA – origin and history –ayurvedic spa – aromatherapy – special spa treatments.	2
Unit IV	Manicure and pedicure – history – definition – techniques – benefits.	2
Unit V	Herbal cosmetics – home recipes – herbal shampoo – herbal tonic– facial hair control – herbal tooth powder.	2

Text Books:

1. Babu,S.S., 2000. Herbal cosmetics - Pushkal publishers, Mumbai.
2. Asharam,2002.Herbal Indian perfumes and cosmetics, Sri satguru publications, New Delhi, India

Powerpoint presentation, Demonstration
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CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	H	H
CO2	H	S	H	L	H
CO3	H	H	H	L	H
CO4	S	H	S	S	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY405	Semester: 4	
Title : BIOCHEMISTRY AND BIOPHYSICS		
Hrs/Week :	5	Credit: 4
Course Objective	To know the biochemical molecules of life To understand the biophysical laws governing universe	

Course Outcome

K1	CO1	To revisit the structure and functions of biomolecules
K2	CO2	To understand the biophysical forces and laws of thermodynamics
K3	CO3	To analyze the biomolecules using simple separation techniques
K4	CO4	To know-how the quantification of biomolecules using selected optical techniques

Unit	Content	Hrs
Unit I	Biochemistry: Biomolecules – structure and functions of carbohydrates (* monosaccharides and polysaccharides), structure, function and synthesis of proteins and lipids.	13
Unit II	Structure and function of nucleic acids (* DNA and RNA) – DNA Replication - enzymes - nomenclature and properties – classification – mechanism of enzyme action (DNA Polymerase) and functions of enzymes.	13
Unit III	Biophysics: Chemical bonds (covalent, noncovalent and ionic) van der waal's forces - laws of thermodynamics - redox potential - redox couple - energy states of atom - spin property of electrons – Pauli's exclusion principle - absorption spectrum in molecules.	13
Unit IV	Biophysical phenomena: pH - principle and measurement–centrifugation: differential and density gradient – centrifuge: principle and types – chromatography: principle, types (paper, column, thinlayer, gas, ion-exchange and affinity) and uses–Electrophoresis:AGE & PAGE.	13
Unit V	Optical techniques: Colorimetry: principle and laws (Lambert's and Beer's) –colorimeter and spectrophotometer –ELISA: principle and applications.	13

**Self study topics*

Powerpoint presentation, Seminar, Quiz, Assignment, Demonstration

Text Books:

1. Jain J.L., 1999. Fundamentals of Biochemistry, S. Chand & Company, New Delhi, India.
2. Subramanian P., 2005. Biophysics: Principles and techniques, MJP Publishers, Chennai.

Reference Books:

3. De Robertis E.D.P., and De Robertis, E.M.F., 1995. Cell and molecular biology, 8th edn. BI. Waverly Pvt. Ltd., New Delhi.
4. Alberts B., Bray, D., Lewis, J. Raff, M. Roberts, K. and Watson, J.D., 1998. Molecular biology the cell. 2nd edn., Garland Pub. Inc., New Delhi.
5. Conn E.E., Stumps, G., Brueming and Doi, R.G., 1987. Outlines of biochemistry, John Wiley & Co., New York.
6. Jayaraman J., 1988. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
7. Lee P.J. and Leegood, R.C., 1999. Plant biochemistry and molecular biology. John Wiley & Sons, Chichester, England.
8. Voet and Voet, 1995. Principles of biochemistry, WCB Publishers, London

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	H	L	H
CO2	M	S	M	L	H
CO3	M	S	H	L	H
CO4	M	H	S	L	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr.R.Kannan	Dr.M.Durairaju	
Ms. D. Sowmiya			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY406 Title: MAJOR PRACTICAL – II (CYTOLOGY, ANATOMY & EMBRYOLOGY & BIOCHEMISTRY AND BIOPHYSICS)		Semester: 4
Hrs/Week :	2	Credit: 4
Course Objective	To learn various anatomical features of higher plants To know the structure and development of anther, ovary, embryo	

Course Outcome

K1	CO1	To recollect the internal structure and functions of angiospermic plants
K2	CO2	To understand the working principle of selected instruments
K3	CO3	To analyze the developmental details of plant embryo
K4	CO4	To prepare permanent micro sections
K5	CO5	To obtain working knowledge in basic biochemical techniques

Unit	Content	Hrs
Unit I	Cell biology: Charts of prokaryotic & eukaryotic cell and cell organelles, DNA, RNA models.	6
Unit II	Anatomy: Plant parts, cell - tissue types - mitosis Stem: shoot apex, primary structure of dicot stem (<i>Tridax</i> and <i>Cucurbita</i>), monocot stem (<i>Sorghum</i>) - normal secondary thickening in a dicot stem (<i>Thespesia</i>) - anomalous secondary thickening in <i>Boerhaavia</i> and <i>Dracaena</i> stems. Leaf: stomatal types, dicot (<i>Nerium</i>) and monocot (Grass). Root: root apex, primary structure of dicot root (<i>Dolichos</i>), monocot root (<i>Canna</i>) - normal secondary thickening in and dicot root (Castor). Anomalous secondary thickening in <i>Achyranthes</i> root.	6
Unit III	Embryology: Flower: Permanent slides on structure of anther, ovule, embryo sac and endosperm (coconut and areca endosperm) - embryo dissection (<i>Tridax</i> and <i>Waltheria</i>), Pollinium dissection (<i>Calotropis</i>).	5
Unit IV	Biochemistry: Complementary colours, Absorption spectrum & Chlorophyll estimation, Verification of Beer's law, Standard graph preparation & estimation of carbohydrate using spectrophotometer, Estimation of sugar using Benedicts reagent, Estimation of protein (by Lowry method), Estimation of lipid by gravimetric method,	5

	Pigment separation using TLC and paper chromatography.	
Unit V	Biophysics (Experiments & Demonstrations) Centrifuge, Separation of cell organelles using centrifuge, pH meter, Estimation of pH in soil and water samples using pHmeter, preparation of buffers, colorimeter, spectrophotometer, electrophoresis, PCR.	5

Preparation of microsections of selected plants, plant parts and discussing their anatomical details, Separation and Quantification of biomolecules using simple apparatus, Demonstrations

CO \ PSO	PS01	PS02	PS03	PS04	PS05
CO1	M	M	S	M	M
CO2	L	S	S	L	H
CO3	M	H	M	L	S
CO4	S	M	S	M	S
CO5	H	M	S	M	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr. R. Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code :	17UBY4N3	Semester: 4
Title	: SKILL BASED ELECTIVE (NON MAJOR) – REMOTE SENSING AND NATURAL RESOURCE MANAGEMENT	
Hrs/Week :	1	Credit: 2
Course Objective	To study the basic principles of remote sensing techniques To understand the role of GIS, GPS in managing Natural resources	

Course Outcome

K1	CO1	To list down the natural resources and biosphere reserves
K2	CO2	To understand the concept of Remote sensing
K3	CO3	To apply remote sensing techniques in Resource management
K4	CO4	To update the recent trends in remote sensing techniques

Unit	Content	Hrs
Unit I	Natural resources – Terrestrial and aquatic (Forest and marine resources) – Biodiversity – Concept – Conservation strategies (<i>in situ</i> and <i>ex situ</i>) – Biosphere reserves – National Parks and Wildlife sanctuaries – IUCN species status.	3
Unit II	Remote sensing – Concept, platforms for remote sensing, satellites, sensors and satellite data products – Interpretation of remotely sensed data-Visual interpretation and digital analysis.	3
Unit III	Remote sensing and vegetation studies – Forest mapping-Land cover classification and change detection studies.	2
Unit IV	Remote sensing for marine resource management – Coastal vegetation surveys – Marine pollution monitoring.	2
Unit V	Recent trends in remote sensing techniques – Role of GIS (Geographical Information System) and GPS (Global Positioning System) – National and International Agencies and their achievements.	2

Power point presentations, Quiz,

Text Books:

1. Thomas Eugene Avery and GraydonLennis Berlin, 1992. Fundamentals of Remote sensing and Airphoto Interpretation.
2. Agrawal K. C., 1996. Biological diversity, Agro Botanical Publishers, New Delhi.

Reference Books:

3. Solbris, Van Embden and Van dordt., 1994. Biodiversity and global changes. CAB International, International Union of Biological Sciences, Wallingford.

CO \ PSO	PSO	PS01	PS02	PS03	PS04	PS05
CO1		H	M	M	M	L
CO2		M	S	M	M	S
CO3		H	S	L	L	S
CO4		M	M	M	M	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr. R. Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY4N4 Title : SKILL BASED ELECTIVE (NON MAJOR) - BIOINFORMATICS		Semester: 4
Hrs/Week :	1	Credit: 2
Course Objective	To introduce classical bioinformatics theory to students To focus computer science techniques used in biological studies	

Course Outcome

K1	CO1	To introduce Bioinformatics and Biological databases
K2	CO2	To comprehend the origin of life and genetic code
K3	CO3	To know-how the gene finding, protein prediction and genetic algorithm
K4	CO4	To analyze the phylogeny between species using pattern recognition and homology

Unit	Content	Hrs
Unit I	Life - origin and evolution – biomolecules – book of life - genetic code – human genome – genomics and proteomics.	3
Unit II	Introduction to bioinformatics – biological databases and searching tools – virtual library – servers for bioinformatics – IT tools for bioinformatics.	3
Unit III	Genetic algorithm – sequence analysis – alignment and similarity search-pattern recognition – structure prediction.	2
Unit IV	Gene finding – protein prediction – tools and databases for biomolecular visualization – drug designing.	2
Unit V	Phylogenetic analysis – tools and databases for phylogenetic tree construction – homology – orthology – paralogy – analogy.	2

Powerpoint presentations, Quiz

Text Books:

1. Lesk A.M.2002, Introduction to Bioinformatics, Oxford University Press,Oxford.
2. Parthasarathy S.,2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002. Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

Reference Books:

4. Chakraborty C., 2004. Bioinformatics Approaches and Application. Chawla offset printers – Delhi.
5. WestheadD.R., J. Parish and R.M.Twyman, 2003. Bioinformatics (instant notes) Viva books private limited – New Delhi.

6. Khan I.A., and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz Publications.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	M	S	L	L	S
C02	L	S	L	L	S
C03	L	S	M	L	S
C04	M	S	L	L	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.R.Kannan	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY507		
Title : TAXONOMY OF ANGIOSPERMS		
Hrs/Week :	5	Credit: 4
Course Objective	To learn nomenclature systems and to identify the plants To introduce modern trends in taxonomy To know the economic uses of plants	

Course Outcome

K1	CO1	To introduce and list down the technical terms used in taxonomy
K2	CO2	To understand the principle and classification of angiosperms
K3	CO3	To create interest in identifying flowering plants in and around the campus
K4	CO4	To get hands-on training in preparing herbarium
K5	CO5	To update the Botanical nomenclature, norms and digital taxonomy

Unit	Content	Hrs
Unit I	Introduction to plant taxonomy-principles-* morphology and technical terms used in taxonomy (root, stem, leaf, inflorescence, flowers and fruits) – Systems of classification – natural (Bentham & Hooker) and phylogenetic (Engler&Prantl) - merits and demerits	13
Unit II	Botanical nomenclature - ICBN (ICN) – typification - author citation - valid publication - herbarium techniques – floras - * Botanical survey of India (BSI) and its function. Modern trends in taxonomy - digital taxonomy - online herbaria - (Royal botanical garden).	13
Unit III	Detailed study of the range of characters and economic importance of the families: Polypetalae :Anonaceae, Capparidaceae, Rutaceae, Anacardiaceae, *Fabaceae, Cucurbitaceae and Apiaceae. Gamopetalae :Rubiaceae, Apocynaceae, Asteraceae,	13
Unit IV	Detailed study of the range of characters and economic importance of the families: Gamopetalae : *Asclepiadaceae, Scrophulariaceae, Acanthaceae, and *Lamiaceae. Monochlamydeae :Amaranthaceae, Euphorbiaceae,	13
Unit V	Monocots : *Orchidaceae, Cannaceae, *Liliaceae, Arecaceae, and Poaceae. * <i>Pollination mechanisms to be included.</i>	13

**Self study topics*

Field study, Identification of plants in the campus, Herbarium preparation
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Text Books:

1. Chopra G.L., 2004 Angiosperm (Systematics and life cycles), Pradeep publications. Jalandhar.
2. PandeyB.P., 1997. Taxonomy of angiosperms. Chand and Co. Ltd. New Delhi.
3. PandeyB.P., 1980.Economic Botany, Chand and Co. Ltd. New Delhi.

Reference books:

4. SharmaO.P., 1993. Plant taxonomy, Tata McGraw-Hill Education,
5. VasishtaP.C., 1994. Taxonomy on angiosperms. S. Chand & Co., New Delhi
6. Gamble J.S.1967. Flora of Madras, Vol. I, II & III. Govt. of India.
7. Jeffrey C., 1976. An introduction to plant taxonomy. Allied publication.
8. Lawrence .G.H.M., 1964. An introduction to plant taxonomy, Central Book dept., Allahabad.
9. Porter C.L., 1969. Taxonomy of flowering plants. Eurassia Publication House, New Delhi.
10. Rendle A.B., 1980. The classification of flowering plants (Vol. 1& 2), Vikas students Edn.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	S	H	H	M	S
C02	S	H	M	H	M
C03	S	M	M	S	M
C04	S	M	S	S	S
C05	S	L	L	S	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	
Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY508	Semester: 5	
Title : MICROBIOLOGY AND PLANT PATHOLOGY		
Hrs/Week :	5	Credit: 4
Course Objective	To know the microbial biodiversity To learn the techniques in bacteriology and immunology To know plant diseases and its control	

Course Outcome

K1	CO1	To appreciate the diversity of microbes
K2	CO2	To understand the basic defence mechanism and concept of Immunology
K3	CO3	To analyse the food and water samples for contamination
K4	CO4	To get hands-on training in culturing microbes
K5	CO5	To learn economically important plant disease

Unit	Content	Hrs
Unit I	Bacteriology: Bacteria - morphology and ultra structure – major features – nutritional types – bacterial respiration - growth and reproduction – *economic importance - culture media and techniques (spread plate, pour plate and streak plate).	15
Unit II	Virology: Virus – characteristics - ultra structure, shape, classification (bacterial, plant and animal viruses) - transmission and reproduction (HIV, Rabies & T4 Phage).	15
Unit III	Immunology: host microbe interaction - antigen, antibody and vaccines - antibiotics - source and mode of action of penicillin and streptomycin - control of microorganisms - chemotherapy.	15
Unit IV	Food and water microbiology: microbial flora of fresh food - food spoilage and poisoning (botulism) - *food preservation- microbial flora of milk - pasteurization and dairy products - cheese production- production of ethanol, vinegar and citric acid. Microbiology of water - detection of coliforms - MPN and MFT.	15
Unit V	Plant pathology: Introduction - brief history - classification of plant diseases - Koch's postulate - symptoms, causal organism and control measures of bacterial (citrus canker), fungal (tikka disease of ground nut, paddy blast, and red rot of sugarcane) and viral (TMV) diseases – biocontrol - biopesticides.	15

**Self study topics*

Powerpoint presentation, Field observation of diseased plants, Quiz, Seminar, Assignment
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Text Books:

1. Ananthanarayanan and Jayarampanikar, Textbook of microbiology.
2. Pelczar JR., M.J., R.D. Reid and E.C.S. Chan, 1983. Microbiology (4thed.) Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi.
3. Purohit, S.S., Microbiology – Fundamentals & applications.
4. Sharma, .P.D., Plant Pathology.

Reference Books:

1. Atlas, R.M., 1996. Principles of Microbiology. Wm.C.Brown Publishers
2. Bergy's manual of systematic Bacteriology.
3. Black, J.G., Microbiology –II Edition, Prentice Hall publications.
4. Churchill, Immunobiology- The Immune System in Health and Disease. Livingstone publication. New York.
5. Freeman, W.H. et al., Fundamentals of applied microbiology. New York
6. Hans G. Schlegel, General Microbiology, 7thed, Cambridge Low Price Edns
7. Kenneth J. Ryan, C. George Ray, Sherris Medical Microbiology: An Introduction to Infectious Diseases.
8. Pelczar, M., E.Chan, N. Kreig, Microbiology, 5thed, MGH.
9. Powar&Daginawala., General Microbiology – Vol. II..
10. Prescott, L.M., Harley JP and Klein DA., 1990. Microbiology. Wan C.Publishers.
11. Rose, A.H., Chemical Microbiology, 3rded, Butterworth World Student Reprints.
12. Salle.A.J., Fundamental Principles of Bacteriology, Tata McGraw Hill.
13. Stanier R., General Microbiology, 5thed, Macmilan Press ltd.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	L	H
CO2	L	S	M	L	M
CO3	L	H	H	L	M
CO4	L	M	H	L	S
CO5	M	M	M	L	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY509	Title : GENETICS & EVOLUTION	
Semester: 5		
Hrs/Week :	5	Credit: 4
Course Objective	To learn the principles and theories of inheritance To know the concepts of classical and modern genetics	

Course Outcome

K1	CO1	To revise the Mendelian Genetics
K2	CO2	To understand the concept of gene and molecular basis of heredity
K3	CO3	To learn the significance of Meiosis
K4	CO4	To analyse the causes of mutation and DNA repair mechanisms

Unit	Content	Hrs
Unit I	Introduction to Genetics - Mendelian inheritance- *Mendel and his experiments with pea plant – Mendel's laws - law of dominance – incomplete dominance – law of segregation - law of independent assortment – Monohybrid cross - dihybrid cross - back and test crosses.	13
Unit II	Non-Mendelian inheritance -interaction of genes –complementary genes – supplementary genes – duplicate genes - inhibitory genes – polygenic inheritance – multiple alleles and blood groups in man.	13
Unit III	Meiosis - crossing over – chromosome maps – linkage – sex linkage – types of sex linkage – sex linked inheritance – cytoplasmic inheritance – chloroplast and mitochondrial inheritance - sex determination – chromosomal – genic balance – hormonal and environmental sex determination.	13
Unit IV	Chemical basis of heredity - DNA as genetic material (McCleod and Mc Carty experiments) - RNA as genetic material (Fraenkel-Conrat experiment) – concept of gene - genetic code - features and properties – prokaryotic (lac operon) and eukaryotic gene expression and regulation	13
Unit V	Mutations - causes of mutation - mutagenic agents – gene mutation - DNA repair mechanisms (photo reactivation, excision and recombinational) - chromosomal aberrations - ploidy - significance of polyploidy.Introduction to evolution – *origin of life – theories of evolution – Lamarck, Darwin and Hugo De Vries – Wisemann theory.	13

**Self study topics*

Powerpoint presentation, Slides, Quiz, Seminar, Assignment
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Text Books:

1. Sinnot, Dunn and Dobshansky, Principles of Genetics. McGraw Hill Pub.
2. Verma P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
3. Chawala H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
4. Gifford, E. M. and Foster, A.S. 1989. Morphology and evolution of vascular plants. W.H. Freeman & Co., Newyork.

Reference Books:

5. Verma P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi.
6. Goodenough V., 1992. Genetics, Saunders College publishing.
7. Kenny *et al.*, Gene regulation and its expression. Plenum press.
8. Lawin, Molecular basis of gene expression. Wiley & Sons.
9. Lewin B. 2002. Genes VII. Oxford University Press, Oxford.
10. Snustad D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc.,
11. Strickberger M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company. USA.
12. Watson J.D. *et al.*, Molecular Biology of the gene. The Benjamin/Cummings.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	H	M	M	L
CO2	L	S	L	M	S
CO3	L	S	M	M	M
CO4	L	S	M	M	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. R. Kannan	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY510 Title : GENETIC ENGINEERING		Semester: 5
Hrs/Week :	5	Credit: 4
Course Objective	To study the basic principles of Genetic engineering To learn the tools and techniques in Genetic engineering	

Course Outcome

K1	CO1	To revisit the molecular tools in genetic engineering
K2	CO2	To understand the principle of gene transfer blotting techniques and DNA amplification
K3	CO3	To analyse the molecular markers and its applications
K4	CO4	To apply the rDNA safety guidelines

Unit	Content	Hrs
Unit I	*Scope and history of genetic engineering - molecular tools in genetic engineering: restriction endonucleases, ligases, phosphatases, methylases, and kinases.	13
Unit II	Host cells - vectors- nomenclature - properties of good vector – types of vectors – plasmid (<i>T_i</i> , <i>PBR₃₂₂</i> & <i>pUC18</i>), bacteriophage (λ phage) - artificial chromosome vectors (BAC & YAC) - transposable elements.	13
Unit III	Gene transfer methods: CaPO_4 and liposome mediated – direct transfer (transformation, transduction, electroporation and microinjection)– construction of genomic and cDNA libraries – amplification of DNA - polymerase chain reaction (PCR)	13
Unit IV	Selection and screening of rDNA – DNA hybridization – DNA probes - blotting techniques (southern, northern and western blots) - molecular markers (RAPD, RFLP and SNPs).	13
Unit V	*Applications of genetic engineering in Biotechnology- DNA Finger printing technique and its applications – DNA barcoding – Biochip- DNA vaccine - recombinant DNA safety guidelines.	13

**Self study topics*

Powerpoint presentation, Quiz, Seminar, Assignment, Case study on the DNA finger printing technique

Text Books:

1. Dubey R.C., 1995. A text book on Biotechnology (2nd Ed), S. Chand & Company Ltd., New Delhi.

2. Gupta P. K., 2001. Elements of Biotechnology, Rastogi Publications. Meerut.
3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.

Reference Books:

4. Brown T.A., 1995. Gene Cloning- an introduction. Chapman and Hall Publications (3rd Ed).New York.
5. Desmond S.T. Nicholl, 2004. An Introduction to Genetic Engineering (2nd Ed). CambridgeUniversity Press.
6. Freifelder D., 1994.Molecular Biology, NarosaPub. Inc., Boston, London.
7. Freifelder D., 1998. Microbial Genetics. Jones and Barlette Pub. Inc., Boston
8. Glick B.R. and Pastumak, J.J.,1998. Molecular Biotechnology – Principles and application of recombinant DNA (2nd Ed) ASM Press, Washington.
9. Glover D.M., 1980. Genetic Engineering, Cloning DNA, Chapman and Hall, New York.
10. Nicholl Desmond S.T., 2002. An Introduction to Genetic Engineering (Second Edition), CambridgeUniversity Press.
11. Old R.W. and Primrose S.B., 1993. Principles of Gene manipulation an introduction to Genetic engineering, Blackwell Scientific Publications.
12. Primrose S.B. and Twyman R.M.,2008. Gene Manipulation. Blackwell Pub. USA.

CO \ PSO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01		L	H	M	L	H
C02		L	S	M	L	H
C03		L	S	M	S	S
C04		L	S	M	L	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY511	Semester: 5	
Title : ELECTIVE I - MATHEMATICS FOR BIOLOGISTS		
Hrs/Week :	5	Credit: 5
Course Objective	To acquire knowledge on basic arithmetics and biostatistical methods To introduce the application of computers in Biostatistics	

Course Outcome

K1	CO1	To revise the basic arithmetic and number system
K2	CO2	To understand the role of mathematics in solving biological problems
K3	CO3	To introduce the statistical methods for analyzing a data
K4	CO4	To analyse and interpret a sample data using various methods
K5	CO5	To update the computer knowledge in presenting the data

Unit	Content	Hrs
Unit I	Maths in Biology – manipulating numbers – units and conversion – molarities and dilutions – areas and volumes – exponents and logs.	13
Unit II	Matrices – types - addition – subtraction - multiplication – determinants – inverse matrix – solving a system of linear equations.	13
Unit III	Biostatistics – introduction - techniques: <i>Frequency distribution</i> - * collection , analysis and graphical representation of data - measures of central tendency: mean, median and mode - measures of dispersion: range, standard deviation, coefficient of variation and correlation.	13
Unit IV	<i>Theoretical distribution</i> – binomial, poisson and normal distribution - <i>Test of significance</i> - Chi-square test – test for goodness of fit (2x2 contingency table, yate's correction to be omitted) - Student 't' test – ANOVA (one way classification).	13
Unit V	Softwares for biostatistics – * MS Office - Word & Powerpoint - Excel: spreadsheet – formula bar - standard deviation – correlation – t- test – Chi square test – ANOVA (one way) – charts.	13

Note: Special instruction to question setters: In either or type of questions in sections B and C, one must be a problem and the other will be a question for descriptive answer.

**Self study topics*

Worksheets, Take home assignments, Seminar, Quiz
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Text Books:

1. Alexis Leona and Mathews Leon, 1999. Introduction to computers. Leon Tech World, Chennai.

2. Cann Alan J., 2003. Maths from scratch for Biologists. John Wiley & Sons Ltd.,Chichester, England.
3. Gurumani, N., 2005. An introduction to Biostatistics. MJP Publishers, Chennai.

Reference Books:

4. ManicavachagomPillay, T.K., T. Natarajan and K.S. Ganapathy, 2006. Algebra Vol.II. S. Viswanathan (printers & publishers) Pvt Ltd., Chennai.
5. Prasad, S., 2001. Elements of Biostatistics. Rastogi publications, Meerut.
6. Edward Batschlet, 1973. Introduction to mathematics for life sciences. Springer Verlag, New York.
7. Pranab Kumar Banerjee, 2004. Introduction to Biostatistics. S. Chand & Company Ltd., New Delhi.
8. Schwartz J.T.,1961. Introduction to matrices and vectors. McGraw Hill Book Company, INC., New York.
9. Simons S., 1964. Vector analysis for mathematicians, scientists and engineers. Pergamon press, The Macmillan Company, New York.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	H
CO2	H	H	L	M	H
CO3	H	M	L	M	S
CO4	L	M	L	M	S
CO5	M	M	L	H	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY5S1 Title : SKILL BASED ELECTIVE (MAJOR) – MICROSCOPIC TECHNIQUES		Semester: 5
Hrs/Week :	1	Credit: 2
Course Objective	To study the principles and applications of microscopy and microtomy	

Course Outcome

K1	CO1	To revise the types of microscopes
K2	CO2	To understand the principle of microscopy
K3	CO3	To obtain the working knowledge on Microscopy and Micrometry,
K4	CO4	To prepare microsection

Unit	Content	Hrs
Unit I	Microscopy – optical principles – light sources – eye piece and lenses – condenser – ergonomics.	3
Unit II	Working principles and types of microscopes – compound – dark field – SEM – TEM.	3
Unit III	Microscopic techniques – sample preparation – sectioning – fixation – staining – slide preparation – smear – squash – maceration – whole mount.	2
Unit IV	Micrometry- ocular and stage –microscopic drawings, camera lucida, microtome- types and working principles	2
Unit V	Photomicrographic techniques – microphotography – photographic processing – developing – printing – computerized microscopy.	2

Powerpoint presentation, Demonstration

Text Books:

1. Johanson D.A., 1940. Plant Microtechnique Tata McGraw Hill, New York.
2. Sase john E., 1964. Botanical Microtechnique - Oxford & IBH.
3. Gray P., 1964. Hand book of Basic Microtechniques–McGraw hill, New York.

Reference Books:

4. Alan PeacockH., 1966. Elementary Microtechnique, Edward Arnold publishers Ltd.UK
5. Prescott L.M., J.P. Harley and C.A. Klein, 2003. Microbiology, 5thEdition McGraw Hill Publishing Company Limited. New York.
6. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2004.Microbiology.5th Edition. Tata McGraw-Hill Publishing Company. New Delhi

CO \ PSO	PS01	PS02	PS03	PS04	PS05
CO1	M	H	H	H	M
CO2	L	S	L	L	H
CO3	L	S	L	L	H
CO4	H	M	L	L	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY5S2 Title : SKILL BASED ELECTIVE (MAJOR) MUSHROOM CULTIVATION		Semester: 5
Hrs/Week :	1	Credit: 2
Course Objective	To acquire knowledge on the mushroom culture	

Course Outcome

K1	CO1	To identify edible mushrooms from poisonous ones
K2	CO2	To understand the mushroom cultivation
K3	CO3	To know-how the mushroom culture techniques
K4	CO4	To create interest in preparing mushroom recipes

Unit	Content	Hrs
Unit I	Introduction to mushroom cultivation: General characters, structure and reproduction of mushrooms – Identification of mushrooms- types of mushroom- Poisonous mushroom.	2
Unit II	Uses of mushroom: Nutritive and food value, Medicinal value	2
Unit III	Mushroom culture techniques: Mushroom shed construction- spawn preparation - medium preparation -spawn running - incubation. Cultivation methods- disease and control measures.	3
Unit IV	Post harvest operations: Harvesting – storage and preservation – spoilage of mushrooms - packing – marketing.	3
Unit V	Mushroom recipes: Mushroom soup, sandwich, gravy, omelette, mushroom chilly, manchurian and briyani.	2

Powerpoint presentation, Demonstration,

Text Books:

1. Nita bahl, 1988. Hand book of mushrooms, Vol. II, IBH publishers.
2. Kannian, 1980. Text book of Mushroom, Today and Tomorrow publishers, Chennai.

Reference Books:

3. Pathak V.N., Yadav N. and Gour M., 2000. Mushroom production and processing technology, Agrobios (India) Ltd.
4. Chang S.T. and N.A.Hayer, 2002. The biology and cultivation of edible mushrooms.
5. Reeti Singh and U.C. Singh, 2005. Modern Mushroom cultivation, Agrobios (India) Ltd.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	S	S	L	S	M
C02	L	H	L	S	M
C03	L	H	S	S	M
C04	L	H	S	S	M

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Ms. D. Sowmiya	Dr.R.Kannan	Dr.M.Durairaju	

Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY612 Title : PLANT PHYSIOLOGY		Semester: 6
Hrs/Week :	5	Credit: 4
Course Objective	To know the cellular functions of plants To understand the physiological functions of plants	

Course Outcome

K1	CO1	To revisit the Plant function and Plant movements
K2	CO2	To understand the concept of water potential, water transport
K3	CO3	To analyse the role of photosynthesis and respiration in plant function
K4	CO4	To enlist various plant growth regulators
K5	CO5	To know the stress physiology of plants and

Unit	Content	Hrs
Unit I	Water relations - *osmosis - absorption of water - water potential and its components - active and passive absorption of water - mineral nutrition - mechanism of ion uptake - role of elements and their deficiency symptoms.	13
Unit II	Transpiration - its kinds, significance and factors - stomatal mechanisms - theories of ascent of sap - translocation of food - photosynthesis - light and dark reactions C_3 - C_4 pathways - photorespiration.	13
Unit III	Respiration - aerobic and anaerobic - glycolysis - Krebs' cycle – electron transport system (ETS). Nitrogen metabolism - nitrogen cycle – biological nitrogen fixation - symbiotic and asymbiotic..	13
Unit IV	Plant growth and development - growth regulators - auxins, gibberellins, kinetins, *ethylene and ABA . Physiology of flowering - photoperiodism – senescence – abscission – Programmed Cell Death (PCD).	13
Unit V	Stress physiology: (water, salt and cold stress) – salt resistance - cold resistance. Plant movements: movements of locomotion – movements of curvature – movements of hygroscopy – seed dormancy.	13

Powerpoint presentations, Simple Experiments, Demonstrations, Seminar, Quiz, Assignments

Text Books:

1. Verma 1984. Plant physiology. Allied publishers, New Delhi.

2. Jain V.K., 2008. Fundamentals of Plant Physiology. S. Chand & Company Ltd., Ram Nagar, New Delhi.

Reference Books:

3. Bidwell R.G.S., 1982. Plant physiology. Collier Mac Million International edn.
4. Devlin R.M., 1969. Plant Physiology. CBS Publishers & Distributors.
5. Salisbury Frank and L.W. Ross, 1986. Plant physiology. CBS Publishers
6. Srivastava, 1982. Plant physiology, CBS Publishers & Distributors.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	M	S	H	L	M
C02	L	S	H	L	L
C03	L	S	H	L	L
C04	L	H	M	L	L
C05	L	H	L	H	H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel		Dr.M.Durairaju	

Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY613 Title : ECONOMIC AND ETHNOBOTANY		Semester: 6
Hrs/Week :	5	Credit: 4
Course Objective	To know the secondary metabolites and therapeutic potentials of plants To acquire knowledge on useful medicinal plants, cultivation methods	

Course Outcome

K1	CO1	To revise the traditional system of medicine
K2	CO2	To understand the phytochemistry and medicinal principles of selected plants
K3	CO3	To analyse the distribution, cultivation, extraction and uses of economically important plants
K4	CO4	To prepare herbal formulations
K5	CO5	To create awareness in conserving medicinal plants

Unit II	Distribution, method of cultivation, extraction, industrial processing and uses of fibre yielding plants- (Cotton, Jute), Oil yielding plants- (Coconut, Ground nut) - General account and sources of timber and biofuels.	13
Unit III	Ethnomedicines: Scope- outline of traditional system of medicine: Siddha- Ayurveda- Unani- Pharmacognosy, *Neutraceuticals and bioactive compounds: biological role and applications of alkaloids and glycosides. Medicinal uses of bacteria (<i>Actinomycetes</i>), Algae (<i>Spirulina</i>), Fungi (<i>Penicillium</i>), Pteridophytes(<i>Lycopodium</i>) and Gymnosperms(<i>Ginkgo</i>).	13
Unit IV	Distinguishing features, phytochemistry and medicinal properties of the following plants. Whole plant (<i>Phyllanthusamarus</i>), Roots (<i>Rauwolfiaserpentina</i>), Rhizome (<i>Curcuma longa</i>), Leaves (<i>Ocimum sanctum</i>), Flower (<i>Hibiscus rosasinensis</i>), Fruits (<i>Emblcaofficinalis</i>) andSeeds (<i>Myristicafragrans</i>).	13
Unit V	Herbal formulations - Poultices and compresses. Plant crude drugs- adulteration- types, methods of collection, processing and storage- practices- evaluation of crude drug- *conservation of medicinal plants.	13

**Self study topics*

Powerpoint presentation, Demonstration
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Text Books:

1. Wallis T.E., 1985. Text book of Pharmacognosy, 5th edition, CBE publishers and distributors, New Delhi.

2. Ali M., 1997. Text book of Pharmacognosy, CBS publishers and distributors, New Delhi.
3. Kumar N.C., (1993). An Introduction to Medical botany and Pharmacognosy. EmkayPublications, New Delhi.

Reference Books:

4. Gokhale S.B., Kokate C.K., Purohit A.P. 1982. NiraliPrakasham Publisher, Pune.
5. Kirtikar and Basu, 1980. Indian medicinal plants Vol. IV, Panni press, Allahabad.
6. Harborne J.B., 1998. Phytochemical methods – A guide to modern technique of plant analysis, 3rd edn., Chapman & Hall, UK.
7. Wijeskera R.O.B., 1991. The medicinal plant industry, CRC press, Boston, London.

CO \ PSO	PSO	PS01	PS02	PS03	PS04	PS05
C01		M	S	H	L	M
C02		L	S	H	L	L
C03		L	S	H	L	L
C04		L	H	M	L	L
C05		L	H	L	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. A. Logamadevi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY614 Title : PLANT BIOTECHNOLOGY		Semester: 6
Hrs/Week :	5	Credit: 4
Course Objective	To acquire knowledge on plant tissue culture To study the role of Biotechnology in food, agriculture and pharmaceutical industries.	

Course Outcome

K1	CO1	To list down the sterilization techniques
K2	CO2	To understand the concept of totipotency, micropropagation and haploid production
K3	CO3	To analyse the gene transfer methods
K4	CO4	To know the technicalities in producing transgenic plants

Unit	Content	Hrs
Unit I	Introduction to plant tissue culture – concept of totipotency and pluripotency - sterilization techniques – solid & liquid medium (MS medium, Whites medium) – callus and cell suspension culture.	13
Unit II	Micropropagation – stages of micropropagation – applications - meristem culture – somatic embryogenesis – principle and applications of somaclonal variation & cryopreservation.	13
Unit III	Haploid production - anther culture – pollen culture – embryo culture and rescue - protoplast isolation, fusion and culture–somatic hybridization – cybrids- *synthetic seeds.	13
Unit IV	Genetic engineering in plants: Mechanism of T-DNA transfer – <i>Agrobacterium</i> mediated gene transfer – selectable markers – marker assisted gene transfer.	13
Unit V	Production of transgenic plants – disease resistant (Bt gene) – herbicide resistant (round up soya) – golden rice (β carotene gene) – <i>FlavrSavr</i> tomato – plantibodies – Intellectual Property Rights (IPR) - *patenting.	13

**Self study topics*

Powerpoint presentations, Group discussion, Seminar, Assignment

Text Books:

1. Chawla H.S., 2000. Introduction to Plant Biotechnology, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
2. Ramawat K.G., 2001. Plant Biotechnology, S. Chand & Company Ltd, New Delhi.

3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.

Reference Books:

4. Street H.E., 1977. Plant tissue culture, Blackwell Scientific Publications, London.
5. Trigiano R.N. and Gray D.J., 1996. Plant tissue culture – concepts and laboratory exercises. CRC Press, Newyork.
6. Ignacimuthu S., 1996. Applied Plant Biotechnology, TataMcGraw Hill Publishing Company Ltd, New Delhi.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	H	H	H	M
CO2	L	H	M	M	H
CO3	L	L	H	M	M
CO4	L	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY615	Semester: 6	
Title : ELECTIVE – II – BIOINFORMATICS&CYBERSECURITY		
Hrs/Week :	5	Credit: 5
Course Objective	To introduce classical bioinformatics theory to students To focus computer science techniques used in biological studies	

Course Outcome

K1	CO1	To introduce the biological databases and computer languages
K2	CO2	To understand the sequence analysis techniques
K3	CO3	To analyse the structure of proteins with the help of computers
K4	CO4	To know-how upload the DNA sequences on NBIA
K5	CO5	To know the role of information security and authentication

Unit	Content	Hrs
Unit I	Bioinformatics - definition - biological database (generalized & specialized) - nucleic acid database - protein database - genome database - bibliographic resources and literature database - bioinformatics servers - Computer languages for bioinformatics - HTML – structure – tags – formatting – hyperlink – graphics; C language –* history – features of C – structure of C program.	13
Unit II	Searching techniques – ENTREZ - sequence analysis tools - sequence alignment - pairwise alignment (BLAST) – multiple sequence alignment (CLUSTAL X) - phylogenetic analysis – tree building and tree analysis.	13
Unit III	Protein prediction - primary structure prediction - secondary structure prediction – bio molecular visualization (RASMOL) – drug discovery - target and lead discovery - Computer Aided Drug designing (CAD).	13
Unit IV	Introduction to computers - Information security - components of communications system – transmission media – protocol definition – Introduction to TCP/IP – wireless network –* Basics of Internet: types of attack : phishing, spoofing, impersonation, dumpster diving – information Security goals – information security threats and vulnerability: spoofing identity - tampering with data – repudiation - information disclosure - denial of service - elevation of privilege.	13
Unit V	Authentication - password management - E-commerce security - windows security - network security: network intrusion detection and prevention systems - firewalls - software security - web security: user authentication - authentication-secret and session management - cross site scripting - cross site forgery - SQL injection - computer forensics - steganography.	13

**Self study topics*

Powerpoint presentation, Seminar, Assignment

Text Books:

1. Lesk A.M., 2002, Introduction to Bioinformatics, Oxford University Press, Oxford.
2. Parthasarathy S., 2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002 Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

Reference Books:

4. Chakraborty C., 2004, Bioinformatics Approaches and Application. Chawla offset printers – Delhi.
5. Westhead D.R., J. Parish and R.M.Twyman, 2003. Bioinformatics (instant notes) Viva books private limited – New Delhi.
6. Khan I.A. and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz Publications.

PSO CO	PS01	PS02	PS03	PS04	PS05
CO1	L	H	L	M	H
CO2	H	H	M	M	H
CO3	H	H	M	H	H
CO4	M	H	H	H	H
CO5	L	M	H	L	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.R.Kannan	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY616 Title : ELECTIVE III- HABITAT ECOLOGY	Semester: 6	
Hrs/Week :	5	Credit: 5
Course Objective	To know the uniqueness of the varying habitats in the biosphere To acquire the knowledge about the structure and functions of different ecosystems To learn the techniques for environmental assessment and ecological dynamics.	

Course Outcome

K1	CO1	To appreciate the various habitats and their vegetation
K2	CO2	To understand the concept of habitats and succession
K3	CO3	To analyse the components of different ecosystems
K4	CO4	To know-how the methods of Environmental audits and Environmental Impact Assessment
K5	CO5	To inventor and manage the natural resources using Remote sensing techniques.

Unit	Content	Hrs
Unit I	Introduction to habitat ecology: historical, ecological & evolutionary perspectives - habitat concepts (edge, ecotones, interspersion and juxtaposition) - units of vegetation – *succession.	13
Unit II	Ecology of major habitats: forest (tropical rain forest, deciduous and coniferous) – scrub jungle and deserts (hot, dry and cold deserts) – grasslands (temperate and tropical).	13
Unit III	Ecology of major habitats: aquatic (fresh water - lentic & lotic) – marine (coasts, estuaries, phytoplankton and phytobenthos, mangroves and coral reefs.) – tundra (arctic and alpine).	13
Unit IV	Physical and anthropogenic factors influencing habitats - habitat degradation and fragmentation - Environmental Impact Assessment (EIA) - environmental audits - *Environmental Legislations and Regulations.	13
Unit V	Inventory of unique habitats and their distribution - Remote Sensing (RS) and Geographical Information System (GIS) - principles and applications of remote sensing techniques - cover classification and mapping - use and values of GIS approaches to habitat ecology.	13

**Self study topics*

Field study, Inventory of Campus vegetation, Powerpoint presentations, Seminar, Assignment
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Text Books:

1. Odum E.P.(ed), 1971. Fundamentals of Ecology, W.B. Saunders Company, Philadelphia.
2. Sharma P.D., 1997. Ecology and Environment, Rastogi Publications, Meerut.
3. Dash M.C., 1993. Fundamentals of Ecology, Tata McGraw Hill, New Delhi.
4. Agarwal K.C., 1989. Environmental Biology, Agro Botanical Publishers (India), Delhi.
5. Ananthakrishnan T.N., 1987. Bioresources Ecology, Oxford and IBH, New Delhi.
6. Kormondy E.J., 1999. Concepts of Ecology, Prentice Hall, New Delhi.

Reference Books:

7. Leonard Ortolano, 1997. Environmental Regulation and impact Assessment. John Wiley & Sons, Inc.
8. Cadogan A. and G. Best, 1992. Environment and Ecology, Nelson Blackie, Glasgow.
9. Lenihan J. and W.W. Fletcher, 1977. Environment and Man, Vol IV. The Chemical Environment, Blackie, London.
10. Pandian T.J., 2000. Biodiversity: Status and Endeavours of India, UNESCO sponsored international workshop on Biodiversity, Ghent University, Belgium, pp. 3-6
11. Subrahmanyam N.S., and Sambamurthy, A.V.S., 2001. Ecology, Narosa Publishing House, New Delhi.

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	H	H
CO2	M	H	L	L	M
CO3	H	H	S	M	M
CO4	M	M	H	L	S
CO5	S	H	S	S	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.R.Kannan	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY617 Title : MAJOR PRACTICAL - III (for V sem theory papers)		Semester: 6
Hrs/Week :	2	Credit: 4
Course Objective	To learn the plant systematics and herbarium techniques To study the physiological processes in the plant system To acquire practical knowledge on plant tissue culture and genetic engineering	

Course Outcome

K1	CO1	To appreciate the diversity of flowering plants and their identification in their natural habit
K2	CO2	To get hands-on training in culturing bacteria
K3	CO3	To identify economically important plant diseases
K4	CO4	To solve biological problems using mathematics
K5	CO5	To create interest in learning the applications of Genetic Engineering
K6	CO6	To obtain working knowledge in creating a word document, powerpoint, excel

Unit	Content	Hrs
Unit I	Taxonomy of Angiosperms Detailed study, description of floral parts of the plant families included in theory paper. Field trip, collection of plants and submission of herbarium 20 sheets. Genetics: Solving problems on Mendelian inheritance and interaction of genes; charts and diagrams from genetics.	6
Unit II	Microbiology: Demonstrations: 1. Microscopy 2. Culture media preparation 3. Pure culture techniques (streak, pour and spread plate) 4. Antibiotic assay Individual experiments 1. Smear preparation 2. Simple staining 3. Differential staining 4. Hanging drop experiment Charts: Ultra structure of bacterium, HIV, rabies, T ₄ phage, antigen and antibody and food and industrial microbiology related charts. Plant pathology Specimens/charts/ of diseases: 1. Citrus canker 2. Red rot of sugar cane	5

	3.Tikka disease of ground nut 4. Paddy blast 5.TMV	
Unit III	Genetic Engineering: Charts/spotters on Genetic Engineering	5
Unit IV	Mathematics for Biologists: Simple problems on 1. manipulating numbers 2. units and conversion 3. molarities and dilutions 4. areas and volumes 5. exponents and logs 6. matrices and determinants. Bio- Statistics: 1. Collection, analysis and graphical representation of data 2. measures of central tendency - mean, median and mode 3. measures of dispersion: range, standard deviation, coefficient of variation correlation 4. Test of significance - Chi-square test and Student 't' test.	5
Unit V	Application of software in Biostatistics: 1. Simple exercises in MS- Word 2. Presentation in MS-Powerpoint 3. Statistical calculations and chart preparation in MS-Excel 4. Creation of database in MS-Access.	5

Identification of plants, Demonstrations, culture techniques

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	S	M	H	H	H
C02	M	M	H	L	H
C03	H	M	H	L	M
C04	H	M	H	L	S
C05	L	M	M	L	S
C06	H	M	H	L	S

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	
Dr. A. Logamadevi			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY618		Semester: 6
Title : MAJOR PRACTICAL - IV(For VI sem theory papers)		
Hrs/Week :	2	Credit: 4
Course Objective	To acquire basic knowledge in mathematics & biostatistics To create programs for bioinformatics To understand bioinformatics tools	

Course Outcome

K1	CO1	To compare the physiological functions of plants under different environmental conditions
K2	CO2	To know the economically important plants and their produces
K3	CO3	To create interest in rearing plants <i>in vitro</i>
K4	CO4	To learn the bioinformatics tools to analyse the protein structure
K5	CO5	To study the vegetation using Quadrat and line transect method

Unit	Content	Hrs
Unit I	Plant physiology Individual experiments: 1. Estimation of water potential (DPD) by liquid immersion method and plasmolytic method. 2. Estimation of osmotic pressure by plasmolysis. 3. Determination of respiration by respiroscope 4. Determination of stomatal frequency and index. 5. Determination of rate of transpiration - Cobalt chloride, Ganongspotometer. 6. Determination of rate of photosynthesis under different CO₂ concentrations & different light intensities using wilmots bubbler	6
Unit II	Plant physiology demonstration experiments: 1. Light screen experiment 2. Soil nitrification 3. Determination of respiratory quotient 4. Essentiality of mineral elements on plant growth – Hydroponics Economic & Ethno Botany Economic importance of fibre yielding plants, oil yielding plants, pulses, cereals, spices and condiments.	5
Unit III	Plant Biotechnology Charts/spotters on Plant biotechnology and transgenic plants Demonstration 1. Media for plant tissue culture	5

	2. Callus induction 3. Regeneration of plantlet 4. Synthetic seeds	
Unit IV	Bioinformatics 1. Programming using HTML 2. Designing and editing of web page, 1. Writing programs using C. 2. Searching and retrieval of biological database. 3. Bibliographic searching using ENTREZ 4. Sequence alignment 5. Gene finding 6. Protein prediction 7. Molecular visualization	5
Unit V	Habitat Ecology 1. Vegetation study by Quadrat and Line transect method 2. Estimation of plant biomass 3. Determination of dissolved oxygen 4. Estimation of CO ₂ in selected water samples 5. Determination of Total Dissolved Solids 6. Spotters and charts on Habitat ecology.	5

PSO CO	PS01	PS02	PS03	PS04	PS05
CO1	M	M	H	M	M
CO2	M	M	M	H	M
CO3	L	M	H	M	M
CO4	M	M	M	S	H
CO5	S	H	S	H	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. R. Kannan	Dr. R. Kannan	Dr.M.Durairaju	
Dr. M. Latha Isabel			

Department	Botany	
Course	B.Sc., Botany	Effective from the Year: 2017
Subject Code : 17UBY6S3 Title : SKILL BASED ELECTIVE (MAJOR) – HORTICULTURE AND PLANT BREEDING		Semester: 6
Hrs/Week :	1	Credit: 2
Course Objective	To study the basic principles of horticulture To learn the techniques of plant propagation To know the methods and practices in plant breeding	

Course Outcome

K1	CO1	To revisit the methods of vegetative propagation
K2	CO2	To understand the principle behind plant propagation
K3	CO3	To propagate plants using simple horticultural techniques
K4	CO4	To develop interest in flower arrangement, fruit preservation and vegetables

Unit	Content	Hrs
Unit I	Scope – methods of vegetative propagation – cutting – layering – grafting – manures – fertilizers – irrigation.	3
Unit II	Gardening – important ornamentals – habits and types – types of garden – kitchen garden – public garden – garden components – lawn – glass house – rockery – water garden - topiary.	3
Unit III	Production technology – plant protection measures for horticultural crops – cultivation of vegetables (Brinjal) – flowers (Jasmine) - terrace gardening.	2
Unit IV	Commercial horticulture – papain – bonsai – flower arrangement – cut flowers – preservation of fruits and vegetables.	2
Unit V	Plant breeding – objectives – plant selection – plant introduction – hybridization – achievements in crop breeding – Paddy.	2

Charts, Powerpoint presentation, Demonstration

Text Books:

1. Mani Bhusan Rao, 1964. Text book of Horticulture. Macmillan India Ltd., New Delhi.
2. Sharon Pastor *et al.*, 2010. Basics of Horticulture, Oxford Book Company, Jaipur.
3. Singh P., 1996. Plant Breeding. Kalyani publishers, New Delhi.

Reference Books:

4. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
5. George Acquaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
6. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.

7. Shukla R.S. and P.S. Chandal, 1998. Cytogenetics Evolution and Plant Breeding. Chand & Company Ltd. NewDelhi.
8. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

CO \ PSO	PSO	PS01	PS02	PS03	PS04	PS05
C01		S	L	M	S	M
C02		M	H	H	M	M
C03		M	H	S	M	M
C04		H	M	S	S	S

S-Strong; H-High; M-Medium; L-Low

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Dr. M. Latha Isabel	Dr.R.Kannan	Dr.M.Durairaju	

Department	Botany		
Course	B.Sc., Botany		Effective from the Year: 2017
Subject Code : 17UBYS6S4 Title : SKILL BASED ELECTIVE (MAJOR): BIOFARMING			Semester: 6
Hrs/Week :	1		Credit: 2
Course Objective	To learn the concept and simple techniques in organic farming		

Course Outcome

K1	CO1	To list down the merits of Biofarming over conventional farming
K2	CO2	To learn the preparation of various organic manures and panchakavya
K3	CO3	To analyse the water and weed management practises
K4	CO4	To prepare herbal pest repellents
K5	CO5	To market the organic crops and certification of organic crops

Unit	Content	Hrs
Unit I	Biofarming – organic farming – introduction – concept – conventional Vs organic farming	3
Unit II	Organic manuring – farmyard manure – green manure – <i>panchakavya</i> - fish tonic – horn manure – composting – vermicomposting- Em4.	3
Unit III	Water and weed management practices – mulching – dry mulching, green mulching, live mulching – stone mulching.	2
Unit IV	Integrated plant protection management – biofence – companion plants – herbal pest repellants- neem formulations – bacterial and fungal biopesticides.	2
Unit V	Organic crops certification – requirements – procedure – validity – labeling- organic crops marketing.	2

Powerpoint presentation, Demonstration, Success story - Discussion

Text books:

1. Pawar R.K., 2009. Organic farming for Sustainable Horticulture. Oxford Book Company, India.
2. Arun K. Sharma, 2004. Biofertilizers for Sustainable Agriculture. Agrobios India Ltd, Jodhpur.

Reference Books:

3. Arun K. Sharma, 2004. A Handbook of Organic farming. Agrobios India Ltd, Jodhpur.
4. Dahama A.K., 2009. Organic farming for Sustainable Agriculture. Agrobios India Ltd, Jodhpur

CO \ PSO	PS01	PS02	PS03	PS04	PS05
C01	L	H	M	M	M
C02	L	M	S	M	H
C03	L	M	S	M	H
C04	L	M	S	M	H
C05	L	H	M	M	H

S-Strong; H-High; M-Medium; L-Low

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. K. Rajalakshmi	Dr.R.Kannan	Dr.M.Durairaju	