RANI CHANNAMMA UNIVERSITY, BELGAUM

DEPARTMENT OF STUDIES IN BOTANY

UNDER THE SCHOOL OF BASIC SCIENCES

M.Sc. in BOTANY

CHOICE BASED CREDIT SYSTEM

REGULATIONS and COURSE STRUCTURE

w.e.f

Academic Year 2015-16 and onwards

RANI CHANNAMMA UNIVERSITY, BELGAUM.

DEPARTMENT OF STUDIES IN BOTANY

UNDER THE SCHOOL OF BASIC SCIENCES

Regulations for Post-Graduate Programme in BOTANY under Choice-Based Credit System (C.B.C.S)

w.e.f. 2011-12

1.0 Course Offered: M.Sc Degree in BOTANY:

2.0 Duration:

The Course shall be of Four Semesters and each semester is of 16 weeks duration. No student shall be permitted to obtain degree earlier than 4 semesters or to take more than 8 semesters, i.e., the student shall complete the course within four years from the date of admission to the first semester of Post Graduate Programme. The academic session in each semester will provide 90 teaching days.

However, the students, who discontinue the programme after one or more semesters due to extraordinary circumstances are allowed to continue and complete the programme with due approval from the Registrar. Candidates shall not register for any other regular course other than Diploma and Certificate Courses during the duration of the PG programme.

3.0 Eligibility Criteria for Admission:

3.1 Candidates who possess a Bachelor's degree in Science of this University or a equivalent Degree of any other university recognized as equivalent thereto with BOTANY as one of the subject having at least 45% of marks in aggregate at degree level is eligible to apply. However, relaxation of 5% of marks in respect of SC/ST/Cat-I will be allowed as per prevailing rules of the University and Government Orders issued from time to time.

3.2 The admission shall be made as per the reservation policy and directions issued in this regard from time to time by the Government of Karnataka and also as per rules as prescribed by the University from time to time.

4.0 Medium of Instruction:

The medium of Instruction shall be English.

5.0 Course Structure:

The term 'Course' is used to indicate a logical part of a subject matter of the programme (also referred to as Paper). In essence, the courses are of three types:

i. Compulsory/ Core Courses
ii. Specialization/Optional Courses and
iii. Open Elective Courses.

There shall be three categories of courses namely, Compulsory courses, Specialization courses and Open elective courses for M.Sc in BOTANY:

In the first semester there shall be 4 core theory papers of 4 credits in each paper and 2 practical's each of 4 credits. In the second semester 3 core theory papers of 4 credits in each paper, 1 open elective of 4 credits and 2 practical's of credits 4. In third semester there shall be 3 core theory papers of 4 credits and one open elective paper of credit 4, 2 practical's with 4 credits each. In the fourth semester there shall be 3 core papers of 4 credits each, 1 practical with 4 credits each and 1 Project with 4 credits. Each Paper shall have five units of 10 hrs each.

Note: The specialization shall be in III & IV Semester.

6.0 Minimum and Maximum Credits:

6.1 "Credit" means the unit by which the course work is measured. For this Regulation, one Credit means one hour of teaching work or two hours of practical work per week. As regards the marks for the courses, 1 Credit is equal to 25 marks, 2 Credits are equal to 50 marks, 3 Credits are equal to 75 marks and 4 Credits are equal to 100 marks as used in conventional system.

6.2 All the Courses in the Department shall carry 4 credits.

6.3 A Student shall register for 24 credits in each semester.

6.4 Total Credits for M.Sc. in BOTANY shall be **96.**

7.0 Attendance :

7.1 Each paper/course shall be taken as a unit for the purpose of calculating the attendance.

7.2 Each student shall sign the attendance maintained for each course for every hour of teaching of each paper.

7.3 Marks shall be awarded to the students for attendance as specified in the regulations concerning the evaluation as shown below:

Attendance (in percentage)	**90 and above**	**Above 80 and upto 90**	**Above 75 And upto 80**	**75 and Below**
Marks	**3**	**2**	**1**	**No Marks**

7.4 A student shall be considered to have satisfied the required attendance for each course, if he/she has attended not less than 75% of the number of instructional hours during the semester.

7.5 There is no provision for condoning shortage of attendance.

7.6 The students who do not satisfy the prescribed requirement of attendance shall not be eligible for the ensuing examination. Such candidates may seek admission afresh to the given semester.

7.7 Such of the candidates who have participated in State/National level Sports, NSS, NCC, Cultural activities and other related activities as stipulated under the existing regulations shall be considered for giving attendance for actual number of days utilized in such activities (including travel days) subject to the production of certificates from the relevant authorities within two weeks after the event.

8.0 Duration of Teaching :

8.1 Each Theory Course covered under the compulsory category shall be taught for 4 hours per week.

8.2 Each Theory Course covered under the Specialization category shall be taught for 4 hours per week.

8.3 Each open Elective Paper shall be taught for 4 hours per week.

9.0 Examination:

9.1 There shall be an examination at the end of each semester.

9.2 Unless otherwise provided, there shall be a semester end examination of 3 hours duration for 80 marks and internal assessment for 20 marks.

9.3 Every student shall register for each semester end examination as per the University notification by submitting duly completed application form through the proper channel and shall also pay the prescribed fees.

9.4 The office of the Registrar (Evaluation) shall allot the Register Number to the candidate at the 1st Semester end examination. That will be the Register Number of the candidate for all the subsequent appearances and semester examinations.

9.5 The answer scripts shall be in the safe custody of the University for a maximum period of six months from the date of announcement of the results. These shall be disposed off after six months.

9.6 The programme under CBCS is a fully carry-over system. A candidate reappearing either the odd or even semester examinations shall be permitted to take examinations as and when they are conducted (even semester examination in even semester and odd semester examination in odd semester).

9.7 Candidates who have failed, remained absent or opted for improvement in any course/s shall appear for such course/s in the immediate two successive examinations that are conducted. However, in the case of candidates appearing for improvement of their marks, the marks secured in the previous examination shall be retained if the same is higher.

9.8 Candidates who desire to challenge the marks awarded to them, in the examinations, may do so by submitting an application along with the prescribed fee to the Registrar (Evaluation) within fifteen days from the announcement of the result.

9.9 Whenever the syllabus is revised, the candidate reappearing shall be allowed for PG Degree examinations only according to the new syllabus.

10.0 Course Weightage:

Course Weightage would be equal to the number of credits awarded to the particular course. For instance, if the Compulsory Course has a credit award of 4, then the appropriate weightage for the course would be 4.

11.0 Course Evaluation :

11.1 Each course shall have two evaluation components - Internal assessment (IA) and the Semester end examinations.

11.2 The IA component in a course shall carry 20 marks (including 3marks for attendance as specified above) and the semester end examination shall carry 80 marks.

11.3 The various components of I.A. for 20 marks are as follows:

i) Attendance	--	3 Marks
ii) Test / Assignment	--	17 Marks

Total	--	20 Marks

11.4 Calendar of tests shall be notified in the first week of each semester.

11.5 The IA marks list shall be notified on the Department Notice Board as and when the individual IA components are completed and the consolidated list shall be submitted to the Office of the Registrar (Evaluation) before the commencement of semester-end examination, or as directed by the University in this regard from time to time.

11.6 The tests shall be written in a separate sheet supplied by the Department/College which shall be open for inspection by the students after evaluation

11.7 There is no provision for seeking improvement of Internal Assessment marks.

11.8 If a candidate remains absent for I.A. Test, there is no provision for Re-test.

11.9 In case of the Project/Dissertation, 20 marks are allotted for viva voce test and 80 marks are allotted for the evaluation of the dissertation/ report at the end of the IV semester.

12.0 Declaration of Results:

12.1 Minimum for a pass in each paper shall be 40% of the total 100 marks including both the IA / Practical and the semester end examinations marks. However, candidate shall obtain at least 40% of the marks in the Semester End Examination (i.e. 32/80). There is no minimum in the IA / Practical marks. However, after adding the IA / Practical and the semester end examinations marks, the candidate shall score a minimum 40% of the maximum marks for the course/paper.

12.2 Candidates shall secure a minimum of 50% in aggregate in all courses/papers of a programme in each semester to successfully complete the programme.

12.3 Candidates shall earn the prescribed number of credits (i.e. 96) for the programme to qualify for the PG Degree in Botany

12.4 For the purpose of announcing the results, the aggregate of the marks secured by a candidate in all the semester examinations shall be taken into account. However, Ranks shall not be awarded in case the candidate has not successfully completed each of the semesters in first attempt or has not completed the programme in the stipulated time or had applied for improvement of results.

12.5 The candidates, seeking improvement of their results shall submit an application along with a prescribed fee to the Registrar (evaluation) and surrender the degree certificate / provisional pass certificate/original marks cards of that semester within 15 days from the date of announcement of the result, or as per the prevailing rules of University from time to time.

13.0 Marks, Credit Points, Grade Points, Grades and Grade Point Average:

13.1 The grade points and the grade letters to candidates in each course shall be awarded as follows:

Percentage of marks	**Grade Points**	**Grade Letter**
75 and above, up to 100.00 %	7.50 to 10.00	A
60 and above but less than 75 %	6.00 and above but less than 07.5	B
50 and above but less than 60 %	5.00 and above but less than 6.0	C
40 and above but less than 50 %	4.00 and above but less than 05.00	D
Less than 40.00 %	Less than 4.00	F

13.2 Credit Point (CP): The Credit Point for each course/paper shall be calculated by multiplying the grade point obtained by the credit of the course.

13.3 The award of Grade Point Average (GPA) for any student is based on the performance in the whole semester. The student is awarded Grade Point Average for each semester based on the Total Credit Points obtained and the total number of credits opted for. The GPA is calculated by dividing the total credit points earned by the student in all the courses by the total number of credits of those courses of the semester.

13.4 The Cumulative Grade Point Average (CGPA) shall be calculated by dividing the total number of credit points in all the semesters by the total number of credits in all the semesters. The CGPA to date shall be calculated by dividing the total number of credit points in all the semesters to date by the total number of credits in all the semesters to date.

CGPA for the I semester =

Sum of the CP of the I semester ÷ Sum of the credits of the I semester

CGPA for the II semester =

Sum of the CP of the I sem.+ Sum of the CP of the II sem. ÷ Sum of the credits of the I semester +II semester

CGPA for the III and IV Semesters shall be computed accordingly.

13.5 The Grade Card at each semester examination shall indicate the courses opted by the student, the credit for the course chosen by the student, the credit points obtained in each course, the grade letter and the grade point average. No class shall be awarded for each semester and the same shall only be awarded at the end of all the semesters based on Cumulative Grade Point Average.

13.6 Class shall be awarded to the successful candidates based on the Cumulative Grade Point Average (CGPA) as specified below:

Cumulative Grade Point Average (CGPA)	**Class to be awarded**
7.5 to 10.0	First Class with Distinction
6.0 and above but below 7.5	First Class
5.0 and above but below 6.0	Second Class
Less than 5.0	Fails

14.0 Question paper pattern:

There will be three sections in a question paper of each theory course for the semester end examination. (Part A, Part B, Part C).

Part A consists of concept based questions. There shall be 8 questions carrying 4 marks each. Students should answer any 5 questions out of 8 questions.

Part B consists of 7 questions carrying 4 marks each. Students should answer any 5 questions out of 7 questions.

Part C consists of questions which are discriptive. There shall be 8 questions carrying 8 marks each. Students should answer any 5 questions out of 8 questions.

Part A	(5 x 4)	20 Marks
Part B	(5 x 4)	20 Marks
Part C	(5 x 8)	40 Marks
Total (Theory Course)		80 Marks

Distribution of Marks:

a) Theory Courses:

Examination	80 Marks
Internal Assessment	20 Marks
Total	100 Marks

b) Practical Courses:

Examination	80 Marks
Internal Assessment	20 Marks
Total	100 Marks

c) Project:

Project	80 Marks
(Dissertation & Viva- voce)	(50 + 30)
Internal Assessment	20 Marks
Total	100 Marks

15.0 Miscellaneous:

15.1 The provisions of any order, rules or regulations in force shall be inapplicable to the extent of its inconsistency with these Regulations.

15.2 The University shall issue such orders, instructions, procedures and prescribe such format as it may deem fit to implement the provisions of these Regulations.

15.3 Procedural details may be given by the University from time to time.

15.4 Any unforeseen problems/difficulties may be resolved by the Vice-Chancellor, whose decision in the matter shall be final.

Illustrative Model:
Grade Card
Programme : M.Sc. in Botany

Name of the candidate: **Semester : I**
Seat No: **Month & Year:**

Course/Papers	Course/Papers Code No.	Credits	Max Marks	Mark Obtained	Semester Grade Point	Credit Points
Compulsory Paper / Core Courses						
• **Course-I**		04	100	60	6.00	24.00
• **Course-II**		04	100	74	7.40	29.60
• **Course-III**		04	100	43	4.30	17.20
• **Course-IV**		04	100	52	5.20	20.80
Practicals						
• **Course-V**		04	100	75	7.50	30.00
• **Course-VI**		04	100	60	6.00	24.00
Total		24	600	364		145.60

GPA for I Semester = Total no.of CP ÷ Total no. of Credits =145.60/24.00=6.06
CGPA for I Semester = GPA = 6.15

$$\text{CGPA for II Sem} = \frac{\text{CP (I Sem)} + \text{CP (II Sem)}}{\text{Credits (I Sem)} + \text{Credits (II Sem)}}$$

$$\text{CGPA for III Sem} = \frac{\text{CP (I Sem)} + \text{CP(II Sem)} + \text{CP(III Sem)}}{\text{Credits (I Sem)} + \text{Credits(II Sem)} + \text{Credits(III Sem)}}$$

$$\text{CGPA for the programme} = \frac{\text{CP (I Sem)} + \text{CP(II Sem)} + \text{CP(III Sem)} + \text{CP(IV Sem)}}{\text{Credits (I Sem)} + \text{Credits(II Sem)} + \text{Credits(III Sem)} + \text{Credits(IV Sem)}}$$

(*CP: Credit Points)

RANI CHANNAMMA UNIVERSITY, BELAGAVI

DEPARTMENT OF BOTANY

CHOICE BASED CREDIT SYSTEM (CBCS)

(w.e.f. 2015-16)

COURSE STRUCTURE AND SCHEME OF EXAMINATION

Sem No.	Course No	Title of the course	Credits	Teaching Hr/week	Maximum Marks		
					Exam proper	I.A.	Total
		Compulsory Courses:					
I	1.1	Microbial Diversity	4	4	80	20	100
	1.2	Biodiversity and Conservation Biology	4	4	80	20	100
	1.3	Systematic Botany of Angiosperms	4	4	80	20	100
	1.4	Evolutionary Biology & Plant Geography	4	4	80	20	100
	1.5	Practical – I Based on 1.1 & 1.2	4	4	80	20	100
	1.6	Practical – II Based on 1.3 & 1.4	4	4	80	20	100
II		**Compulsory Courses:**					
	2.1	Biochemistry and Bio-Physics	4	4	80	20	100
	2.2	Developmental Biology	4	4	80	20	100
	2.3	Genetics and Plant Breeding	4	4	80	20	100
		Open Elective Course:					
	2.4	Medicinal Plants	4	4	80	20	100
		Compulsory Courses:					
	2.5	Practical – III Based on 2.1	4	4	80	20	100
	2.6	Practical – IV Based on 2.2 & 2.3	4	4	80	20	100
III		**Compulsory Courses:**					
	3.1	Plant Physiology	4	4	80	20	100
	3.2	Cell Biology and Molecular Biology	4	4	80	20	100

	3.3	Medicinal Plants & Herbal Drug Technology	4	4	80	20	100
		Open Elective Course:					
	3.4	Plant Propagation Techniques	4	4	80	20	100
		Specialization Courses:					
	3.5	Practical V: Based on 3.1	4	4	80	20	100
	3.6	Practical VI: Based on 3.2 & 3.3	4	4	80	20	100
IV		**Compulsory Courses:**					
	4.1	Mycology and Plant Pathology	4	4	80	20	100
	4.2	Ecology and Environmental Biology	4	4	80	20	100
	4.3	Plant Biotechnology	4	4	80	20	100
	4.4	Project	4	4	80	20	100
	4.5	Practical VII: Based on 4.1	4	4	80	20	100
	4.6	Practical VIII: Based on 4.2 & 4.3	4	4	80	20	100

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE: Bot 001	**TEACHING HRS: 04 hrs/ week**

1.1 Microbial Diversity

1. Diversity in structure and organization of Eubacteria, Spirochetes, Rickettsias, Chlamydias, Actinomycetes, Archaebacteria, mycoplasmas and Cyanobacteria, metabolic diversity in relation to phototrophic, chemolithotrophic, symbiotic, saprophytic and parasitic mode of life. Diversity in relation to photosynthetic pigments and energy conversion. Diversity in carbon utilization by microorganisms, microbial diversity in the degradation of natural substances such as cellulose, xylene starch and other glucans, fructose, pectans, chitin, lignin, methane, aromatic hydrocarbons etc and its ecological significance.
2. Methods of studying microbial biodiversity various culture methods biodiversity of culturable bacteria. Isolation strategies recovering microbial biodiversity using environmental DNA, environmental genomics, screening environmental libraries preservation of microbial biodiversity, polyphasic taxonomy of microorganisms.
3. Toxin producing microorganisms and cyanobacterial blooms-their ecological significance.

   Viruses, Viroids and Prions bacterial animal and plant viruses their diversity in structure and organization.

   Genetic diversity, vertical and horizontal gene transfer in microbial diversification and speciation.
4. Structural diversity distribution and the ecological significance of lichens.

   Fungal biodiversity- taxonomic diversity, general structural features and the latest classification.

References:

1. **Microbial diversity and ecosystem function1995 Allsopp, D. R.R. colwell and D.L. Hawksworth , CAB international Wallingford U.K.**
2. **Measuring and monitoring fungal diversity 1999 G. Mueller , A.Y. Rossman and G.F. Bills Smithsonian Institution press , Washington DC.**
3. **Global Biodiversity Assessment 1995, V.H. Heywood, Cambridge University Press, Cambridge.**
4. **Modern soil microbiology1997, J.D. Van Elsas, J.T. Trevors and E.M.H. Wallington Morcal Dekker, Newyork.**
5. **General Microbiology 1993 H.G. Schlegal Cambridge University press, Cambridge.**
6. **General Microbiology 1998 S.B. Sullia and S. shantharam oxford & IBH Publication, New Delhi.**
7. **Fundamentals of Mycology,1983 J.H. Burnett, William Clows and Sons , London.**
8. **Fungal spores and their liberation and dispersal C.T. Ingold 1971 Oxford University press Oxford.**
9. **The fungi an advanced treatise Vol I-IV Ainsworth and Sussman A.S. 1965,1966,1968,1973 Academic Press Newyork.**

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	**TEACHING HRS: 04 hrs/week**

1.2 Biodiversity and Conservation Biology

(4 credits)

Unit I

Biodiversity: Definition, levels of diversity - genetic, species and ecosystem diversity. Endemism - concept, types, endemism in Western Ghats, Biodiversity hotspots - general and with special reference to India; Mega-diversity regions.

Unit II

Threats to biodiversity, IUCN threatened plant categories, methods of conservation: *In-situ* methods - National parks, Biosphere reserves, sacred grooves.

Ex-situ methods: Botanical gardens, Germplasm collection seed bank, pollen bank

Unit III

Environmental movements: Global and regional. Environmental laws : Forest Conservation Act, Biodiversity bill (2002); Community Biodiversity Register (PBR); Convention on International Trade in Endangered Species (CITES), Ramsar Convention, Intellectual Property Rights (IPR)

Unit IV

Biodiversity Management: Sustainable development, Environmental Impact Assessment (EIA) Ecological restoration, Afforestation, Green belt, Social forestry, Agroforestry. Remote sensing and biodiversity management.

Reference:

Ahmedullah, M. and M.P. Nayar, 1986. Endemic plants of the Indian
region. Vol 1. Botanical Survey of India.

Krishnamurthy K V 20014. An advanced text book of Biodiversity, Principles and Practice. Oxford and IBH Publishing Co. Lvt. Ltd.

Negi S S 1933. Biodiversity and its conservation in India. Indus Publishing Company, New Delhi

Primack, Richard B 2006. Essentials of conservation biology, 4th edition, Senaceer Associates, Sunderland, Mass.

Rao R R 1994. Biodiversity in India (floristic aspects). Bishen Singh Mahendra Pal Singh, Dehradun

Ravikumar K and D K Ved 2000. Illustrated fidd guide to 100 red-listed medicinal plants of conservation concern in Southern India

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	TEACHING HRS: 04 hrs/week

1.3 Systematic Botany of Angiosperms

(Credit 4)

Unit I

Brief history and development of plant classification, sexual system of Linnaeus, Artificial system, Natural system and phytogenetic systems. Detailed study of Benthan & Hooker's system. Outlines of Hutchinson, Cronquist and APG systems.

Unit II

Botanical Nomenclature: Need for scientific names, history of botanical nomenclature. Principles of ICBN, typification, rule of priority, ranks of taxa and nomenclature of taxa, effective and valid publication, citation, retention, choice and rejection of names and epithets, conservation of names, names of hybrids, names of cultivated plants.

Unit III

Botanical Survey of India - organization and contributions of BSI

Herbarium methodology, significance of herbaria; floras

Taxonomic evidence: Chemotaxonomy, Cytotaxonomy, Embryology as taxonomic evidence. Brief account of numerical taxonomy

Unit IV

Study of the following families with economic important, systematics and phylogeny:

Magnoliaceae, Menispermaceae, Capparidaceae, Polygalaceae, Caryophyllaceae, Meliaceae, Oxalidaceae, Balsaminaceae, Meliaceae, Droseraceae, Combretaceae, Melastomataceae, Cactaceae, Sopotaceae, Oleaceae, Loganiaceae, Gentianaceae, Lentibulariaceae, Podostemaceae, Piperaceae, Myristicaceae, Lauraceae, Loranthaceae, Moraceae, Orchidaceae, Zingiberaceae, Commelinaceae, Araceae, Cyperaceae, Poaceae

Reference:

Bennet, S.S.R. 1979. An Introduction to Plant nomenclature. International Book Distributors. 9/3. Rajpur Road, Dehra Dun
248001. India.

Sivarajan V.V., 1985. Introduction to Principles of Plant Taxonomy, Oxford and IBH Publication, New Delhi.

Bhattacharya B. and B.M. Johre. 1998. Flowering plants -
Taxonomy and phylogeny. Narosa Publishing House, New Delhi.

Gurucharan Singh, 1999. Plant systematics - Theory and practice. Oxford and IBH Publishing Co., Pvt Ltd., New Delhi.

Heywood, V.H. and Moore, D.M. 1984. Current Concepts in Plant Taxonomy. Academic Press, London.

Heywood V.H., 1976. Botanical Systematics, Academic Press London.

Lawrence, H.M., 1966. Taxonomy of vascular plants. The Mac Million Company, New York.

Stace, C.A. 1989. Plant Taxonomy and Biosystematics(2nd Edition. Edward Arnold Ltd., London.

Singh G., 1999. Plant Systematics, Oxford and IBH, New Delhi.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	TEACHING HRS: 04 hrs/week

Syllabus

Evolutionary Biology and Plant Geography

Evolutionary Biology:

I. **Origin of Life** – A biogenesis, Hypothesis of panspermia. Theory of Chemical of evolution, origin of life at molecular level process- structure of *Cosmos* primitive earth, prebiotic synthesis, origin and evolution of RNA world, Ribonucleoprotein, adaptive radiation in progenote, Evolution of Eukaryotes – Endosymbiotic hypothesis, theories of evolution- Lamarckism Neolamarkism, Darwinism, Neo-Darwinism, Germplasm theory, Mutatiuon theory and Synthetic theory.

II. **Population genetic and Evolution** – Madeline population, gene pool, gene frequency, genetic drift, founder effect, genetic polymorphism, Hardy Weinberg's Law, Genetics equilibrium and mechanism of speciation. Patterns of evolution in plants- Evolution of vegetative, reproductive structure in Algae, Fungi, Bryophytes, Pteridophytes and spermatophytes (Evolution of sporophytes in Bryophytes). Steelar evolution in Pteridophytes, Heterospory and seed habit. Fossil forms- *Lepidodendron, Lepidocarpon, Stigmaria.*

Plant Geography:

III **Principles of Plant Geography**- Origin of islands and Continents- Pangea, Panthalasa, Laurisia, Gondwana land, Plant tectonics and Continental drifts. Center of origin of cultivated plants, Vavilo centers and Zhukosky centers with plants in each region.

IV **Plant distribution and Plant migration**- Floristic regions of the world. Phytogeographical regions of India, Hansen's classifications, distribution of plants based on altitude and latitude, contisin, tricontisin and endemic distribution. Age and area hypothesis- Wills theory. Plant migration and barriers for plant migration.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	TEACHING HRS: 04 hrs/week

Practicals - I: (1.1 - Microbial Diversity)

1. **Preparation of media sterilization, inoculation.**
2. **Observation and identification of mycoplasma and Spiroplasma their related genera**
3. **Bacterial smear positive and negative staining.**
4. **Gram staining acid fast staining cell wall staining**
5. **Bacteria in milk ,curd and root nodules.**
6. **Estimation of soil microbes.**
7. **Streak plate method and air borne microbes.**
8. **Vegetative organization in fungi.**
9. **Asexual and sexual reproduction in fungi.**
10. **Different fruiting bodies in fungi.**

Note: The PG Department of Botany, Rani Channamma Univerisity, reserves the right to modify the Practicals list as required from time to time.

RANI CHANNAMMA UNIVERSITY, BELGAVI. SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: PG – IN BOTANY	
COURSE CODE:	**NO OF TEACHING HRS: 04 HRS**

Practicals - I: (1.2 - Biodiversity and Conservation Biology)

1. Study of endemic plants (a minimum of 10) - their taxonomy - distribution, threats, status and economic use, if any.

2. Study of the following medicinal plants - distribution, taxonomy, status, threats and parts used: *Vinca rosea*, *Rauvolfia serpentine*, *saraca asoca*, *Phyllanthus amarus*, *Cassia fistula*, *Adhathoda zeylanica*, *Aloe vera*, *Andrographis paniculata*, *Azadirachta indica*, *Eclipta prostrata.*

3. Uses of biodiversity: Distribution, origin, name family and parts used of the following: *Cinnamomcum zeylanicum*, *Acacia concinna*, *Piper betel*, *Theobroma cocoa*, *Ficus carica*, *Vanilla planifolia*, *Garcinia indica*, *Coffea arabica*, *Cucuma longa*, *Cajanus cajan*

4. Remote sensing application - vegetation mapping.

5. Using maps demarcate the location and extent of National parks and biosphere reserves of India.

6. Field visit to Forest ecosystem/ Wetland ecosystem/ a sacred groove.

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RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	TEACHING HRS: 04 hrs/week

Practicals - II: (1.3 - Systematic Botany of Angiosperms)

Study of the family characters of families listed in the theory part with representative specimens.

1. Identification of plants to the family, genus and species level using keys (Cook's flora, Gamble's flora or Flora Karanataka by Saldanha can be used)
2. Preparation and submission of 20 herbarium sheets (Use very commonly available species for herbarium preparation, strictly avoid collecting rare plants)
3. Field trips to nearby floristically rich areas.

Note: The PG Department of Botany, Rani Channamma Univerisity, reserves the right to modify the Practicals list as required from time to time.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:	TEACHING HRS: 04 hrs/week

Practicals- II (1.4 -EVOLUTIONARY BIOLOGY AND PLANT GEOGRAPHY)

1. Study of homologous, analogous and vestigial organs.
2. Study of molecular evolution with suitable examples.
3. Patterns of Evolution in plants-vegetative and reproductive structures in Algae and Fungi.
4. Evolution of Sporophytes in Bryophytes.
5. Stellar evolution in Pteridophytes.
6. Study of Heterospory
7. Study of fossil forms –Lepidodendron, Lepidocarpon, Stigmaria and Lygenopteris.
8. Study of center of origin of cultivated plants.
9. Plant Phytogeography.
10. Plant migration and distribution with examples.
11. Study of adaptive radiation, micro and macro evolution with examples
12. Calculating gene frequencies in population by Hardy-Weinberg law.
13. Study of Vavilov centers and Zhnkosky centers with plant in each region.

Note: The PG department of Botany, Rani Chennamma University, reserves the right to modify the practicals list as required from time to time.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR II SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE: Bot001	**TEACHING HRS: 04 hrs/ week**

2.1 Biochemistry

1. Physical and chemical properties of water, nucleotides, nucleic acids structure of nucleotides and poly nucleotides . Chemical and physical properties of nucleic acids. Amino acids general properties; peptide bonds, classification and characteristics of amino acids.

   Proteins-primary structure, solubility of protein, protein sequencing, protein conformation, protein folding alpha-helix and beta sheets, Rammachandra Plot, Hydropathic index, solid phase synthesis of polypeptides, protein denaturation.
2. Carbohydrates-A brief account of monosaccharide's and disaccharides, structure of starch cellulose, pectin and chitin.

   .lipids-lipid classification and chemical structure and physical properties of saturated and unsaturated fatty acids.

   Enzymes- nature and classification of enzymes, enzyme specificity, reaction rates and activation energy, enzyme kinetics. Micheaelis-Menten equation, Line weavers Burk plot. Kinetics of bisubstrate reactions. Kinetic tests for determining inhibition mechanisms.

Biophysics

3. Atoms, bonds and molecules. Basic principles of diffusion, osmosis and viscosity, and their application in biology.

   Electromagnetic radiation-electromagnetic spectrum and light scattering absorption and emission of electromagnetic radiations by biomolecules. Fluorescence and phosphorescence. Theory of fluorescence-instrumentation, polarization and anisotropy of fluorescence. Fluorescence spectroscopy applied to protein, nucleic acids and membranes.
4. Nuclear Magnetic Resonance: The phenomenon of energy absorption and relaxation, chemical shifts. Instrumental; techniques –Proton NMR,C-13 NMR,P-31 NMR, two dimensional NMR-FINMR, solid state NMR, Magnetic resonance imaging. Application of NMR in the study of proteins. Nucleic acids ,membranes and metabolism.

   Mass spectrometry- basic theory and instrumentation, general modes of fragmentation

   Gas Chromatography and Mass Spectroscopy (GCMS), FTIR spectroscopy and LASERS its applications in biology and medicine.

References:

1. **Principles of Biochemistry (2000) lehninger macmilon , worth publisher.**
2. **Fundamentals of Biochemistry (1999) D. Voet,J.G. Voet and C. W. Pratt, Johnwiley and sons.**
3. **Biochemistry (1998) K. C. Van Holde , W.C. Johnson and P. Shing Prentice Hall International.**
4. **Essential of biophysics (2000) P. Narayan New Agri International publishers .**
5. **Modern Experimental Biochemistry (2000) R. Boyer, Benjamin, Cumming.**
6. **Fundamentals of Molecular Spectroscopy (1994) C.V. Banwell and E.M. Mccash ,Tata Mcgrew –Hill publishing co. Ltd.**

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR II SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:Bot001	**TEACHING HRS: 04 hrs/ week**

2.2 Developmental Biology of Plants.

1. **Differentiation and cell polarity** in acellular (Dictyostelium) unicellular (Acetabularia, ficus egg, equisetum spore) and multicellular (root hair and stomata formation)systems shoot apical meristems (SAM)origin structure and function organogenesis formation of auxiliary buds. Cytohistological zonation and biochemical activity in the shoot apex and ultra structure of meristems, shoot apical meristem organization, SAM mutants the mechanism of leaf primordium initiation, Phyllotaxis positioning, transition to reproductive phase, vernalization – changes in the biochemical activity.
2. **Developmental pattern at the flowering apex,** ABC model, specification floral organs, molecular aspects of MADS box genes during flower development. Cellular differences in between floral organs . senescence a general account; structure and function of root apical meristem(RAM) quiescent centre, origin of lateral roots, genetics of root development.
3. **Androgenesis-** Histochemical , ultra structural, genetical and fictional aspects concept and significance of male germ unit. **Gynogenesis-** Histochemical, ultra structural, genetical and fictional aspects concept and significance of female germ unit. Pollination and fertilization-structural and functional aspects of pollen, stigma and styles in the current aspects of fertilization. Male sterility concept, causes and mechanism and present status.
4. **Embryogenesis-** Cellular and biochemical aspects, composition and function of endosperm in relation to embryo development. Regulation of gene activity during zygotic embryogenesis, embryo suspensor- composition and function. **Seed development and**

germination-Physiology and biochemistry expression of genes during seed germination. Seed dormancy and role of hormones Photo morphogenesis-photoreceptors, structure and function.

References:

1. Robert F. Lyndon 1988 The Shoot Apical Meristem, Cambridge University, Press, UK.
2. Bhojwani S.S. and Bhatnagar S.P. 1998, 2000 The Embryology of Angiosperms, Vikas Publishing House, New Delhi.
3. Poething R.S. 1997 Leaf Morphogenesis in Flowering Plants. In the Plant Cell Vol-9:1077-1087 pp.
4. Jarine Chory 1997 Light Modulation of Vegetative Development the Plant Cell Vol.9:1225-1234 pp.
5. Kropf. D.L. 1997 Induction of Polarity in Fucoid Zygotes. The Plant Cell Vol.9:1011-1020pp.
6. Singhal D.L. 2001 Concepts in Photobiology , Photosynthesis and Photomorphogenesis Narosa Publishing Houce New Delhi.
7. Johri,B.M. 1984 Embryology of Angiosperm Springer-Verlog, Berlin.
8. Raghavan V. 1986 Embryogenesis in Angiosperms, Cabridge University Press Cambridge.
9. Wearing P.F. and Philips, I.D.S.1981 Growth and Differentiation in Plants. Pergamon Press, Oxford U.K.
10. Bell P.R. 2000 Green Plants, their origin and Diversity, Cambridge University Press, Cambridge.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR II SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE:Bot001	**TEACHING HRS: 04 hrs/ week**

Paper-2.3: Genetics and Plant Breeding

Unit I :

Transmission Genetics: An over view of Mendelian Genetics, extension of Mendelian's principles: Quantitative inheritance, multiple alleles, lethal allele. Extra nuclear inheritance: Inheritance of mitochondrial and chloroplast genes, male sterility in plant.

Sex determination: Role of chromosomes and hormones in sex determination, molecular basis of sex determination and dosage compensation in man and Drosophila, Genetic disorders in man and their managements, Genetic testing and counselling, sex determination in plants.

Unit II

Population Genetics: Population and gene pools , Hardy-Weinberg's Law, Factors effecting allelic frequencies in population- Mutation, Migration, Nonrandom mating, selection, genetic drift, genetic equilibrium.

Linkage and crossing over, Cytological and molecular basis of crossing over, recombination and gene mapping.

Unit III

DNA as genetic material, Gene concept, Mechanism of DNA replication in prokaryotes and eukaryotes, Enzymes in DNA replication. Types and role RNA, Genetic code-Contribution of Nirenberg and Khorana. Transposable genetic elements: AC-DS elements in Maize, mechanism of transpositions. Human genome project.

Unit IV

Plant Breeding: Mode of reproduction, methods of hybridization in self and cross pollinated plants, Plant Introduction, Domestication and acclimatization, patterns of evolution in crop plants. Heterosis-genetic basis of heterosis. Breeding plants for resistance to abiotic and biotic stresses.

References:

1. Genetics: Denial J Fairbanks
2. Concept of Genetics 4th Ed: William S Klung and M R Cummings
3. Genetics: MW Stritckberger
4. Understanding GENETICS-A molecular approach. Norman V Rothwell
5. Molecular Genetics: G S Stent
6. Genetics-Analysis and Principles: Robert J Brooker
7. Genetics 4th Ed: Susan Elrod and William Stan field
8. The Human Genome: R Scott Hawley and Catherine and Mori
9. Principles of Genetics: D Peter Snustad et al.
10. Elementary Principles of Plant Breeding, Chaudhary H K.
11. Heterosis, Frankel R and Bet Dagan.
12. Principles and Practices of Plant Breeding, Sharma J K
13. Plant Breeding, Singh B D.
14. Plant Breeding-Theory and Practices, Chopra V L.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR II SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE: Boto 001	**TEACHING HRS: 04 hrs/ week**

OPEN ELECTIVE
MEDICINAL BOTANY (4 Credits)

Theory

Unit 1: History, scope and importance of medicinal plants. A brief account of Indigenous medicinal sciences- Ayurveda, Siddha and Unani. Brief account of herbal formulations and preparations.

Unit 2: Plant identification- Elementary knowledge of Binomial nomenclature- Outline of Bentham and Hooker classification, Herbarium techniques and deposition of specimen in herbaria, Ethnic communities of India. Ethnobotany and folk medicine, Applications of ethnobotany.

Unit 3: Study of some important medicinal plants with reference to their systematic position, diagnostic features, methods of propagation and medicinal uses of *Solanum trilobatum, Cardiospermum halicacabum, Vitex negundo, Adathoda vasica, Azadirachta indica, Gloriosa superba, Eclipta alba, Aristolochia indica, Phyllanthus amarus, Boerhaavia diffusa, Curcuma longa, Ocimum sanctum, Centella asiatica, Aloe vera, Coleus forskohlii* and *Costus speciosus*.

Unit 4: Methods of preparation of herbal extracts and phytochemical analysis. Antibacterial and antifungal activity assay of herbal extracts, Medicinal plants and plant products used in the treatment of Jaundice, cardiac problems, infertility, cancer and diabetes. Conservation of medicinal plants- *In situ* and *Ex situ*. IPR and Patenting.

Practicals:

1. Identification and medicinal value of locally available medicinal plants.
2. Morphology of the useful parts of important medicinal plants.
3. Methods of propagation of important medicinal plants.
4. Demonstration of solvent/s extract/s preparation using Soxhlet apparatus.
5. Demonstration of antibacterial/ antifungal activity using medicinal plant extracts.

References:

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.
3. Yoganarasimhan, S. N. Medicinal Plants of India- Vol 1- Karnataka, Interline Publishing Pvt.
4. Gokhale, S. S., Kokate, C. K. and Purohit, A. P. (1994). Pharmacognosy. Nirali Prakashan. Pune.
5. Tyagi and Dinesh Kumar (2005). Pharma Forestry. Field Guide to Medicinal Plants. Atlantic Publishers and Distributors, New Delhi.
6. Singh and Jain (1985). Taxonomy of Angiosperms. Rastogi Publications, Meerut.
7. Sinha R. K. and Shweta Sinha (2001). Ethnobiology. Surabhe Publications – Jaipur.
8. Pal, D. C. and Jain, S. K. (1998). Tribal medicine. Naya Prakash, Bidhan Sarani, Calcutta.
9. Jain, S. K. (1995). Contribution to Indian ethnobotany. 3rd edition, Scientific publishers, Jodhpur, India.
10. Jain, S. K. (1995). A Manual of Ethnobotany , 2nd edition.
11. John R. Dean. (2010). Extraction Techniques in Analytical Sciences John Wiley & Sons, Ltd. UK.
12. Surhone, L. M., Tennoe, M. T. and Henssonow, S. F. (2011). Soxhlet Extractor. Betascript Publishing. Germany.
13. Schwalbe, R., Moore, L. S. and Goodwin, A. C. (2007). Antimicrobial susceptibility testing protocols. CRC Press, Taylor and Francis Group, Boca Raton, London, New York.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR II SEMESTER	
NAME AND COURSE: M.Sc – IN BOTANY	
COURSE CODE: Bot001	TEACHING HRS: 04 hrs/ week

2.5 Practical Based on 2.1

1. **Extraction of chloroplast pigments and demonstration of their absorption spectra.**
2. **Extraction of seed protein depending upon the solubility.**
3. **Estimation of proteins.**
4. **UV and usible spectra of biomolecules.**
5. **Fractionation of proteins by gel filtration.**
6. **Estimation of phospholipids.**

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2.6 -Practical- IV Based on 2.2

1. Microtome sections of germinated / ungerminated embryo to demonstrate the structure and organization of SA and RAM using histochemical stains (PAS, Protein and RNA)
2. Histochemical nature of matured shoots and root apices using thin sections (PAS, Protein, RNA and DNA)L.S. of Maize , Banyan, Pistia, Jussiena roots,
3. Histochemical nature of floral meristems (PAS, Protein DNA, RNA)
4. Developmental and histochemical nature of anther/Ovule/Embryo(PAS, Protein, RNA)
5. Invitro pollen germination to find out the percentage of viability and also the effect of volatile substances on germination and tube growth use different methods of culture (hanging, sitting suspension, surface).
6. Acetolysis test to demonstrate the nature of pollen wall.
7. Study to composition of wet and dry stigmatic papillae (Esterase, peroxidase, RNA, Proteins, PAS)
8. Multiple staining for localizing pollen tubes in the pistil.
9. DNA flurochromes to study the nuclei of pollen grains and pollen tube.
10. Study of different types of endosperm, isolation of different embryonic stages.

RANI CHANNAMMA UNIVERSITY, BELGAVI. PG - SYLLABUS FOR Ist SEMESTER	
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COURSE CODE: Bot001	**TEACHING HRS: 04 hrs/week**

2.6 -Practical –IV Based on 2.3

1. Preparation of karyotypes using Feulgen technique
2. Determination of mono, dihybrid and test cross satio.
3. Mutation induction by EMS
4. Polyploidy induction by colchicines
5. Extraction of eye pigments in Drosophila by paper chromatography
6. Genetics problems on linkage and crossing over, gene mapping and population genetics.
7. Techniques of Emasculation and hybridization.
8. Pollen viability, germination test and TTC test.