

SCHOOL OF ARCHITECTURE, SCIENCE AND TECHNOLOGY
YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY

Detail Syllabus:

V134: M. Sc. (Botany) {2021 Pattern}

2021

CONTENTS

Basic Information	6
Programme Objective and Scope	6
Mode of Education	7
Mode of Examination	7
Basic Information	7
Eligibility and Fees	8
Programme Structure	8
Teaching-Learning Scheme:	9
Years and Courses	9
Grading System	10
Evaluation Pattern.....	11
Successful Completion of Course or Programme	11
Year I	12
BNY011: BIOLOGY & DIVERSITY of VIRUSES, BACTERIA & FUNGI	12
Programme Information	12
Course Information	12
Presumed Knowledge and Learning Objectives.....	12
Units.....	12
Detailed Syllabus.....	14
Learning Resource Details.....	15
BNY012: BIOLOGY & DIVERSITY of ALGAE, BRYOPHYTA & PTERIDOPHYTA	16
Programme Information	16
Course Information	16
Presumed Knowledge and Learning Objectives.....	16
Units.....	16
Detailed Syllabus.....	17
Learning Resource Details.....	18
BNY013: GYMNOSPERMS, TAXONOMY of ANGIOSPERMS & ANATOMY	19
Programme Information	19
Course Information	19
Presumed Knowledge and Learning Objectives.....	19
Units.....	19
Detailed Syllabus.....	21
Learning Resource Details.....	22
BNY014: BIOCHEMISTRY & PLANT PHYSIOLOGY.....	23
Programme Information	23

Course Information	23
Presumed Knowledge and Learning Objectives	23
Units	23
Detailed Syllabus	24
Learning Resource Details	25
BNY015: BIOLOGY & DIVERSITY of VIRUSES, BACTERIA & FUNGI (PRACTICAL)	26
Programme Information	26
Course Information	26
Presumed Knowledge and Learning Objectives	26
Units	26
Detailed Syllabus	27
Learning Resource Details	28
BNY016: BIOLOGY & DIVERSITY of ALGAE, BRYOPHYTA & PTERIDOPHYTES (PRACTICAL)	29
Programme Information	29
Course Information	29
Presumed Knowledge and Learning Objectives	29
Units	29
Detailed Syllabus	30
Learning Resource Details	31
BNY017: GYMNOSPERMS, TAXONOMY & ANATOMY of ANGIOSPERMS (PRACTICAL)	32
Programme Information	32
Course Information	32
Presumed Knowledge and Learning Objectives	32
Units	32
Detailed Syllabus	33
Learning Resource Details	34
BNY018: BIOCHEMISTRY & PLANT PHYSIOLOGY (PRACTICAL)	35
Course Information	35
biochemistry and plant physiology	35
Presumed Knowledge and Learning Objectives	35
Units	35
Detailed Syllabus	37
Learning Resource Details	37
YEAR II	40
BNY021: CELL BIOLOGY, GENETICS, BIOSTATISTICS & ECOLOGY	40
Programme Information	40
Course Information	40
Presumed Knowledge and Learning Objectives	40
Units	40
Detailed Syllabus	41

Learning Resource Details.....	42
BNY022: MEDICINAL PLANTS & EMBRYOLOGY of ANGIOSPERMS	43
Programme Information	43
Course Information.....	43
Presumed Knowledge and Learning Objectives.....	43
Units.....	43
Detailed Syllabus.....	45
Learning Resource Details.....	46
BNY023: APPLIED MYCOLOGY & PLANT PATHOLOGY	47
Programme Information	47
Course Information.....	47
Presumed Knowledge and Learning Objectives.....	47
Units.....	47
Detailed Syllabus.....	48
Learning Resource Details.....	49
BNY024: PLANT MOLECULAR BIOLOGY & BIOTECHNOLOGY	50
Programme Information	50
Course Information.....	50
Presumed Knowledge and Learning Objectives.....	50
Units.....	50
Detailed Syllabus.....	51
Learning Resource Details.....	52
BNY025: LABORATORY MANUAL: CELL BIOLOGY, GENETICS, BIOSTATISTICS & ECOLOGY (PRACTICAL)	53
Programme Information	53
Course Information.....	53
Presumed Knowledge and Learning Objectives.....	53
Units.....	53
Detailed Syllabus.....	55
Learning Resource Details.....	55
BNY026: MEDICINAL PLANTS & EMBRYOLOGY of ANGIOSPERMS (PRACTICAL)	57
Programme Information	57
Course Information.....	57
Presumed Knowledge and Learning Objectives.....	57
Units.....	57
Detailed Syllabus.....	58
Learning Resource Details.....	59
BNY027: APPLIED MYCOLOGY & PLANT PATHOLOGY (PRACTICAL)	60
Programme Information	60
Course Information.....	60
Presumed Knowledge and Learning Objectives.....	60

Units.....	60
Detailed Syllabus.....	62
Learning Resource Details.....	63
BNY028: PLANT MOLECULAR BIOLOGY & BIOTECHNOLOGY (PRACTICAL)	64
Programme Information	64
Course Information	64
Presumed Knowledge and Learning Objectives.....	64
Units.....	64
Detailed Syllabus.....	66
Learning Resource Details.....	67
END OF DOCUMENT	67

M. Sc. (BOTANY) {2021 PATTERN}

BASIC INFORMATION

PROGRAMME OBJECTIVE AND SCOPE

This programme is designed to achieve following objectives and scope.

Mission: The 'M.Sc. Botany' Program aims to develop understanding about basic facts, concepts, principles and procedures of required in the field of Botany and explore solutions to everyday real life problems by pursuing further research

Objectives: The 'M.Sc. (Botany)' Program will

- Provide a strong foundation for better understanding of the value of flora and its relevance to the society and our environment
- Develop a thirst to preserve the natural resources and environment.
- Provide a strong foundation for a better understanding of current advances in Botany and its practical significance.
- Expose students to current trends in research about Botany.
- Understand the scope and significance of the discipline.
- Imbibe love and curiosity towards nature through the living plants.
- In order to make students open-minded and curious, we try our best to enhance and develop a scientific attitude.
- We make the students fit for the society by enabling them to work hard.
- Make the students exposed to the diverse life forms.
- Make them skilled in practical work, experiments, laboratory equipment and to interpret correctly on biological materials and data.
- Develop interest in Biological research.
- Encourage the students to do research in related disciplines.
- Develop a thirst to preserve the natural resources and environment.
- Develop the ability for the application of acquired knowledge in various fields of life so as to make our country self-sufficient
- Appreciate and apply ethical principles to biological science research and studies

Scope of the programmes: After successful completion of this programme, students may get opportunities in various fields/sectors to work as

- Career opportunities in both private and government sector/ in India and abroad
- Job opportunities in sectors like Seed & bio-fertilizer industries, Indian Forest Services, Germplasm Conservation Laboratories, Botanical Consultant & Developer, Plant Scientist, Pharmacologist, Mycologist, etc
- Inculcation of research attitude
- Inculcation of entrepreneurship
- Perceive higher education and research in the same or allied fields like veterinary science
- The graduates can go for many fields in botany such as Plant **Taxonomy, Ethnobiology, Pathology, Palaeobotany and Palynology, Plant cytology, Plant geneticists, Plant ecology, Plant Scientists and Weed Scientists etc.**
- Candidates who have advanced qualifications can pursue either an academic career in institutions as **lecturers and professors or a scientific career** in various scientific positions such as Plant Scientists, Weed Scientists etc.
- They can also go and work as **Researchers and as administrators.**
- They have also the option in **Botanical Survey of India** and other **Government departments.**

Employment Areas in Private Sector:

- Drug Companies
- Nurseries
- Biotechnology Firms
- Food Companies
- Oil Industry
- Fruit Growers
- Seed Companies
- Chemical Companies
- Lumber or Paper Companies
- Biological Supply Houses

Employment Areas in Government Sector:

- National Park Service
- Departments of Environmental Protection
- Departments of Conservation and Land Management
- Departments of Agriculture and Water)
- Animal and Plant Health Inspection Services
- Nature Conservancy
- Public Health Service
- Environmental Protection Agency
- Smithsonian Institute
- Department of Agriculture
- Medical Plant Resources Laboratory
- Forest Service

MODE OF EDUCATION

This Programme will be offered in Open and Distance Learning (ODL) Mode as defined in “UGC Open and Distance Learning Programmes and Online Programmes Regulations, 2020” published in the gazette notification by dated 4th Sept 2020 by the UGC as specified below.

“Open and Distance Learning Mode means a mode of providing flexible learning opportunities by overcoming separation of teacher and learner using a variety of media, including print, electronic, online and occasional interactive face-to-face meetings with the learners or Learner Support Services to deliver teaching-learning experiences, including practical or work experiences”

MODE OF EXAMINATION

Continuous Assessment is conducted at recognized learner support centres/ study centres and End Examination for all type of courses is conducted at recognized Exam Centres of the University under supervision.

BASIC INFORMATION

1. **Mode of Education:** Open and Distance Learning (ODL) Mode
2. **Minimum Programme Duration:** 2 years/ 4 semesters after Candidates with B.Sc. with Botany at FY and SY/ B.Sc. (Agri) or Equivalent pass
3. **Learner Support Centers/ Study Centers:** University approved/ recognized Senior Science Colleges/ Institutes
4. **Medium of Instruction:** English
5. **Attendance:** Minimum 80% attendance for all type of courses.
6. **Minimum Programme Duration:** 2 years after Graduation
7. **Teaching-Learning:** 36 working weeks per year

8. **Total Teaching-Learning Support:** 960 Hours in each year
9. **Total Courses:** 16 courses (subjects) at year 01-02
10. **Total Credits:** 48 Credits. As per UGC norms 1 Credit means 30 hours of study efforts required to gain learning of particular content of each credit.
11. **Year Credits:** 24 Credits in each year (16 credits for Theory and 08 credits for Practical).
12. **Total Courses and Credit Points:**

Year	Theory	Practical	Credits
01	4	4	24
02	4	4	24
Total credits			48

13. **Passing:** Minimum 40% or better marks

14. **Credit Transfer:**

15. **Continuous Assessment:** Continuous Assessment conducted for Continuous evaluation during teaching-learning for 20% Weightage

16. **End Exam:** End Examination conducted for Summative evaluation of the student for 80% Weightage

17. **Degree Certification:** Aggregate performance and Class in the programme reported on the basis of performance.

18. **Curriculum Design:** Student centric curriculum is designed to enable professional ability, employability and skill enhancement.

19. **Approval/Equivalence Status:** UGC Approved. UGC-DEB Approval is available on UGC Website

ELIGIBILITY AND FEES

Admission Eligibility	Certification Eligibility	Fees and Deposit / Year UF is payable for a year to the university at the time of online admission	
Candidates with B.Sc. with B.Sc. with Botany at FY and SY/ B.Sc. (Agri) or Equivalent pass	Min 40% or better marks, in all Theory type of courses, with total 48 credits at Year 01 to 02	Description	INR ₹
		University Fee (UF)	8000
		Study Center/ Learner Support Center Fee (LSCF)	12,000
		Total ≈	20000
		Refundable LD (Payable only when student choose to avail Library Facility at the SC)	1,500

PROGRAMME STRUCTURE

V134: M.Sc. (Botany) {2021 Pattern}				
Course → Year ↓	Course 01, 4 CR, T	Course 02, 4 CR, T	Course 03, 4 CR, T	Course 04, 4 CR, T
Year 01 24CR	BNY011: Biology and Diversity of Viruses, Bacteria, and Fungi	BNY012: Biology and Diversity of Algae, Bryophyta and Pteridophyta	BNY013: Gymnosperms, Taxonomy of Angiosperms and Anatomy	BNY014: Biochemistry and Plant Physiology
	Course 05, 2 CR, P	Course 06, 2 CR, P	Course 07, 2 CR, P	Course 08, 2 CR, P
	BNY015: Biology and Diversity of Viruses, Bacteria, and	BNY016: Biology and Diversity of Algae, Bryophyta and	BNY017: Gymnosperms, Taxonomy of Angiosperms and Anatomy	BNY018: Biochemistry and Plant Physiology

	Fungi	Pteridophyta		
Year 02 24CR	Course 01, 4 CR, T	Course 02, 4 CR, T	Course 03, 4 CR, T	Course 04, 4 CR, T
	BNY021: Cell Biology, Genetics, Biostatistics and Ecology	BNY022: Medicinal Plants and Embryology of Angiosperm	BNY023: Applied Mycology and Plant Pathology	BNY024: Plant Molecular Biology and Biotechnology
	Course 05, 2 CR, P	Course 06, 2 CR, P	Course 07, 2 CR, P	Course 08, 2 CR, P
	BNY025: Cell Biology, Genetics, Biostatistics and Ecology	BNY026: Medicinal Plants and Embryology of Angiosperm	BNY027: Applied Mycology and Plant Pathology	BNY028: Plant Molecular Biology and Biotechnology

TEACHING-LEARNING SCHEME:

Description	Total 8 (Twelve) Theory Courses in Programme Total 8 (Eight) Practical Courses in Programme
Face-to-face Counselling Sessions for interaction, problem solving and conduction of practical activities at Study Centre	12 hrs each of 01 clock hour duration for each Theory Course of 4 Credits, Study Hours – 60
	12 hrs each of 02 clock hour duration for each Practical/ Activity Course of 2 Credits, Study Hours – 60
Delivery of Information	08 Books in SLM format: 30 Hours/ for each 08 WorkBooks in SLM format: 60 Hours/ for each
Self-Study, Learning Evaluation and Feedback	(1) Solving Problems, Self-Tests, SAQs and Exploring more Details on Text-Book: 30 Hours
Total Study Hours	(8 x 60 = 480 Hours + 8 x 60 = 480 Hours) = 960 Hours

YEARS AND COURSES

SN	Code	Name	CA	EE	TM	Type	CR	Min %
I Year:24 Credits								
01	BNY011	Biology and Diversity of Viruses, Bacteria, and Fungi	20	80	100	T	4	40%
02	BNY012	Biology and Diversity of Algae, Bryophyta and Pteridophyta	20	80	100	T	4	40%
03	BNY013	Gymnosperms, Taxonomy of Angiosperms and Anatomy	20	80	100	T	4	40%
04	BNY014	Biochemistry and Plant Physiology	20	80	100	T	4	40%
05	BNY015	Biology and Diversity of Viruses, Bacteria, and Fungi	10	40	50	P	2	40%
06	BNY016	Biology and Diversity of Algae, Bryophyta and Pteridophyta	10	40	50	P	2	40%
07	BNY017	Gymnosperms, Taxonomy of Angiosperms and Anatomy	10	40	50	P	2	40%
08	BNY018	Biochemistry and Plant Physiology	10	40	50	P	2	40%
II Year:24 Credits								

SN	Code	Name	CA	EE	TM	Type	CR	Min %
09	BNY021	Cell Biology, Genetics, Biostatistics and Ecology	20	80	100	T	4	40%
10	BNY022	Medicinal Plants and Embryology of Angiosperm	20	80	100	T	4	40%
11	BNY023	Applied Mycology and Plant Pathology	20	80	100	T	4	40%
12	BNY024	Plant Molecular Biology and Biotechnology	20	80	100	T	4	40%
13	BNY025	Cell Biology, Genetics, Biostatistics and Ecology	10	40	50	P	2	40%
14	BNY026	Medicinal Plants and Embryology of Angiosperms	10	40	50	P	2	40%
15	BNY027	Applied Mycology and Plant Pathology	20	80	100	P	4	40%
16	BNY028	Plant Molecular Biology and Biotechnology	10	40	50	P	2	40%

GRADING SYSTEM

1. **“Absolute Grading”**: the marks are converted to grades based on pre-determined class intervals.
2. **“Letter Grade”**: It is an index of the performance of students in a said programme. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
3. **“Grade Point”**: It is a numerical weight allotted to each letter grade on a 10-point scale. Grade Point shall be “o (Zero)” for Letter Grade “Ab” and “F”. The marks scored by the examinee shall be converted into grade points by dividing the marks scored in the aggregate and dividing the resulting number by maximum marks, multiplying the result by ten, retaining the integer part (ignore the fractional part). Thus if a person has secured 56 marks out of 100 marks in aggregate for a course, we get $(56/100) \times 10$ which is 5.6. Ignoring the fraction, we get 5 as the grade point.

Letter Grade	Grade Point	Class
O	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
B	6	Above Average
C	5	Average
P	4	Pass
F	o	Fail
Ab	o	Absent

4. **“Credit Point”**: It is the product of grade point and number of credits for a course.
5. **“Semester Grade Point Average (SGPA)”**: It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
6. **“Cumulative Grade Point Average (CGPA)”**: It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
7. **“Transcript or Grade Card or Certificate”**: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course

details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

EVALUATION PATTERN

SN	Type of Course	Continuous Assessment	End Examination
1	Theory (T)	“Continuous Assessment (CA)” of total 20 4SAQs, each of 5 marks, 1 SAQ on each CR in a Single attempt only	“End Examination (EE)” of total 80 Marks and 16 “Short Answer Questions (SAQs)” each of 05 marks (4 out of 5 SAQs on each Credit), during 150 Minutes
2	Practical (P)	Student is required to submit “Activity Report” of total 10 Marks and total 2 Activities, each of 5 Marks on each CR in a Single Attempt only	External and internal examiners shall assess each student based on for total 40 Marks: Conduct of One Randomly Selected Practical Activity – 10 Marks Viva-Voice – 10 Marks Journal (Workbook) - 10 Marks and Report of Practical Activity – 10 Marks Duration: 120 minutes

Evaluation Pattern Of Practical Type Courses of 2 CR

SN	Description	Internal Examiner	External Examiner	Total Marks
	Duration of End Exam: 120 minutes (2hrs)	Batch size: ≈ 15 students		
a	Actual Conduct of 1 randomly selected practical activity	04 Marks	06 Marks	10
b	Viva-Voice	03 Marks	07 Marks	10
c	Workbook	04 Marks	06 Marks	10
d	Report of Practical Activity with Diagram, synoptic Answers, Graph/Observation and Conclusion	04 Marks	06 Marks	10
	Total	15 Marks	25 Marks	40 Marks

- Separate and independent passing @ 40% in EE and (CAT+EE) shall be essential for Theory and Practical component of each course.** “CA, EE and Total marks” shall be separately reported for each course in the transcript or mark-statement.
- Only 1 attempt** for EE for **each course** shall be allowed in **each semester**.
- Only best of past performance shall be reported in transcript or mark statement.**
- Total student evaluation for**
 - Each** year shall be for **600** marks
 - Each** regular PG degree shall be for **1200** marks.

SUCCESSFUL COMPLETION OF COURSE OR PROGRAMME

- "Successful Completion of the Course" means - either course is exempted or student gets minimum specified or better grade, either in end examination of that course or by credit transfer. A student obtaining grade “F” shall be considered failed and will be required to reappear in the examination. The student obtained minimum “P” (Pass) letter grade required for successful completion of the each course.
- "Successful Completion of the Programme" means – all courses at all semesters are successfully completed and the student obtained “P” (Pass) letter grade for all courses at all semesters along with minimum specified SGPA and CGPA.

YEAR I

BNY011: BIOLOGY & DIVERSITY OF VIRUSES, BACTERIA & FUNGI

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nasik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(Botany)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY011	Biology and Diversity of Viruses, Bacteria and Fungi	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B.Sc. with BOTANY or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to</p> <ul style="list-style-type: none"> Study General Characters and Classification of Viruses Know Economic Importance of Bacteria Study General Characters, Reproduction and Classification of Fungi Define Fungi in Industry, Agriculture and Forestry

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05	General Characters and Classification of Viruses Chemistry and Ultrastructure of Viruses Isolation and Purification of Viruses Replication and Transmission of Viruses General Account of Plant, Animal and Human Viral Diseases	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04	General Account and Classification of Eubacteria, Archaeobacteria and Cynobacteria Ultrastructure, Nutrition and Reproduction of Bacteria Economic Importance of Bacteria Mycoplasma	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04 03-05	General Characters and Classification of Fungi Ultrastructure of Cell and Cell Wall Composition Nutrition in Fungi Reproduction in Fungi Heterothallism, Heterokaryosis and Parasexuality	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

04-01	Mastigomycotina and Zygomycotina	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-02	Ascomycotina, Basidiomycotina, Deuteromycotina		
04-03	Fungi in Industry		
04-04	Fungi in Agriculture and Forestry		
04-05	Fungi as Human and Animal Parasites (Medical Mycology)		
04-06	Fungi as Food		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	GENERAL CHARACTERS AND CLASSIFICATION OF VIRUSES:- Historical Account, Occurrence, Morphology, Components of Viruses, Nomenclature, Classification.	CR 01
1-2	CHEMISTRY AND ULTRASTRUCTURE OF VIRUSES:- Introduction,Chemistry of Viruses, Ultra structure of TMV, Ultra structure of T ₄ Bacteriophage, Ultra structure of HIV.	
1-3	ISOLATION AND PURIFICATION OF VIRUSES:- Isolation of Viruses, Purification of viruses, Criteria for Purity and Preservation.	
1-4	REPLICATION AND TRANSMISSION OF VIRUSES:- Introduction, Replication of Bacteriophages, , Replication of TMV, Transmission of Viruses.	
1-5	GENERAL ACCOUNT OF PLANT, ANIMAL AND HUMAN VIRAL DISEASES:- Introduction, Plant Diseases Caused by Viruses, Important Virus Families and Viruses, Viral Diseases of Animals, Viral Diseases of Humans.	
2-1	GENERAL ACCOUNT AND CLASSIFICATION OF EUBACTERIA, ARCHAEBACTERIA AND CYNOBACTERIA: -Introduction,Description Bacteria and Nomenclature, Classification, Size of Bacteria, Staining Reactions, Colony Formation, Gram Negative Eubacteria, Gram Positive Eubacteria, Eubacteria Lacking Cell Walls, Archaeobacteria,Cynobacteria.	CR 02
2-2	ULTRASTRUCTURE, NUTRITION AND REPRODUCTION OF BACTERIA:- Nutrition, Reproduction in Bacteria	
2-3	ECONOMIC IMPORTANCE OF BACTERIA:- Role of Bacteria in Industry, Role of Bacteria in Medicine, Biogeochemical Cycle, Biofertilizers, Sewage Treatment, Biopesticides, Bacterial Insecticides, Biological Control, Biodegradation, Harmful Activities of Bacteria.	
2-4	MYCOPLASMA:- Characteristics Features of Mycoplasma, Economic importance of Mycoplasma, Conclusion	
3-1	GENERAL CHARACTERS AND CLASSIFICATION OF FUNGI:- Vegetative Structure, Reproduction, Classification of Fungi, Recent Trends in Classification, Origin and Phylogency of Fungi.	CR 03
3-2	ULTRASTRUCTURE OF CELL AND CELL WALL COMPOSITION:- Ultrastructure of Fungal Cell, Cell Wall Composition	
3-3	NUTRITION IN FUNGI:- Nutrition, Necrotrophs and Biotrophs, Nutritional requirements and Physiology of Fungi, Growth Requirements, Hyphal Growth.	
3-4	REPRODUCTION IN FUNGI: -Reproduction, Vegetative Reproduction, Asexual Reproduction, Asexual Fruiting Structures, Sexual Reproduction, Parasexuality and Heterokaryosis, Heterothallism, Taxonomic Implications in Sexual Reproduction, Sex Hormones in Fungi, Life Cycles in Fungi.	
3-5	HETROTHALLISM, HETROKARYOSIS AND PARASEXUALITY:- Heterothallism, Heterokyrosis, Parasexuality.	
4-1	MASTIGOMYCOTINA AND ZYGOMYCOTINA:- Mastigomycotina, Zygomycotina.	CR 04
4-2	ASCOMYCOTINA, BASIDIOMYCOTINA, DEUTEROMYCOTINA:- Ascomycotina, Basidiomycotina, Deuteromycotina.	
4-3	FUNGI IN INDUSTRY:- Production of Alcohols, Production of Antibiotics, Production of Organic acids.	
4-4	FUNGI IN AGRICULTURE AND FORESTRY:- Fungi as Plant Parasites, Mycorrhizae, Biofertilizers, Phosphate Solubilizers, Plant Growth Promoting Rhizobacteria, Microbial Decomposition and Recycling of Agricultural Wastes, Vermicomposting, Biofertilizer Availability, Need for an Integrated Organizational Structure, Fungi as Biocontrol Agents.	
4-5	FUNGI AS HUMAN AND ANIMAL PARASITES (MEDICAL MYCOLOGY):- Superficial Infections, Systemic Infections or deep seated Mycoses, Intermediate Infections.	
4-6	FUNGI AS FOOD:- Mushrooms, Fungal Protein.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY011			
Text-Books			
BNY011-T01	Biology & Diversity of Viruses, Bacteria and Fungi i. Prof. B. Badraiah, ii. Prof. G. Bhagyanarayana, iii. Prof. K. V. Mallaiah, iv. Prof. K. Murugesan, v. Dr. A. Nagamani	2007	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY011 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY011-WL1			

BNY012: BIOLOGY & DIVERSITY OF ALGAE, BRYOPHYTA & PTERIDOPHYTA

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(Botany)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY012	Biology and Diversity of Algae, Bryophyta and Pteridophyta	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: B. Sc. with BOTANY or equivalent from a recognized University/Board.	After successful completion of this course, student should be able to <ul style="list-style-type: none"> • Study General Characteristics and Classification of Algae • Study General Characteristics and Classification of Bryophyta • Study General Characteristics and Classification of Pteridophyta

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05	General Characteristics and Classification Thallus Organization in Algae Reproduction and Life Cycles of Algae Life Histories of Some Genera of Chlorophyta – I Life Histories of Some Genera of Chlorophyta – II	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04 02-05	General Characters of Cyanophyta General Characters of Some Genera Of Xanthophyta and Bacillariophyta General Characters and Life Histories of Some members of Phaeophyta General Characters and Life Histories of Rhodophyta Economic Importance of Algae	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

03-01	General Characters, Classification, Distribution and Economic Importance of Bryophytes	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-02	Marchantiales, Jungermanniales		
03-03	Anthoceratales and Sphagnum		
03-04	The Evolution of Gametophyte		
03-05	Evolution of Sporophyte		
04-01	General Characters and Classification of Pteridophytes	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-02	Structure and Life Histories of <i>Psilotum</i> , <i>Lycopodium</i> , <i>Selaginella</i> and <i>Equisetum</i>		
04-03	Telome Theory and Stelar Evolution		
04-04	Heterospory and Seed Habit		
04-05	Fossil Pteridophytes(<i>Rhynia</i> , <i>Psilophyton</i> and <i>Calamites</i>)		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	GENERAL CHARACTERISTICS AND CLASSIFICATION:- General Characters, Classification of Algae, Distribution of Algae.	CR 01
1-2	THALLUS ORGANIZATION IN ALGAE:- Types of Thalli	
1-3	REPRODUCTION AND LIFE CYCLES OF ALGAE:- Reproduction, Life Cycles in Algae.	
1-4	LIFE HISTORIES OF SOME GENERA OF CHLOROPHYTA – I:- <i>Chlamydomonas</i> , <i>Volvox</i> , <i>Chlorella</i> , <i>Scenedesmus</i> .	
1-5	LIFE HISTORIES OF SOME GENERA OF CHLOROPHYTA – I:- <i>Ulva</i> , <i>Enteromorpha</i> , <i>Oedogonium</i> , <i>Cosmarium</i> , <i>Caulerpa</i> .	
2-1	GENERAL CHARACTERS OF CYANOPHYTA:- Distribution, Position of Algae in Plant Kingdom, Range of Plant Body, <i>Spirulina</i> , <i>Lyngbya</i> , <i>Tolypothrix</i> .	CR 02
2-2	GENERAL CHARACTERS OF SOME GENERA OF XANTHOPHYTA AND BACILLARIOPHYTA:- <i>Xanthophyta</i> , <i>Vaucheria</i> , <i>Bacillariophyta</i> , <i>Navicula</i> , <i>Cyclotella</i> .	
2-3	GENERAL CHARACTERS AND LIFE HISTORIES OF SOME MEMBERS OF PHAEOPHYTA:- Distribution, Position of Algae in Plant Kingdom, Range of Plant Body, <i>Ectocarpus</i> , <i>Laminaria</i> , <i>Sargassum</i> .	
2-4	GENERAL CHARACTERS AND LIFE HISTORIES OF RHODOPHYTA:- Distribution, Position of Algae in Plant Kingdom, Range of Plant Body, <i>Poriphyra</i> , <i>Gelidium</i> , <i>Gracilaria</i> .	
2-5	ECONOMIC IMPORTANCE OF ALGAE:- Algae in Industry, Algae in Agriculture, Algae as Food, Algae as Fodder, Algae in Medicine, Algae in Oil, Gas, Energy and Chemicals, Algae in Sewage Treatment, Algae in Experimental Works, Algae in Water Supplies, Algae in Waste Land Reclamation, Algae in Bio-fouling, Algae as Indicators of Pollution, Toxicity, Algae in Parasitism, Single Cell Protein, Biofertilizers.	
3-1	GENERAL CHARACTERS, CLASSIFICATION, DISTRIBUTION AND ECONOMIC IMPORTANCE OF BRYOPHYTES: General Characters, Classification, Distribution, Economic Importance.	CR 03
3-2	MARCHANTIALES, JUNGERMANNIALES:- Marchantiales, Jungermanniales, Pellia.	
3-3	ANTHOCERATALES AND SPHAGNALES:- Anthoceratales, <i>Anthoceros</i> , Sphagnales, Sphagnum.	
3-4	THE EVOLUTION OF GAMETOPHYTE:- Retrogressive Evolution Theory, Progressive Evolution Theory.	
3-5	EVOLUTION OF SPOROPHYTE:- Theory of Sterilization, Reduction Theory.	
4-1	GENERAL CHARACTERS AND CLASSIFICATION OF PTERIDOPHYTES:- General Characters,	CR 04

	Relationship with their Relatives, Abnormalities in the Life Cycle of Pteridophytes, Classification.
4-2	STRUCTURE AND LIFE HISTORIES OF PSILLOTUM, LYCOPODIUM, SELAGINELLA AND EQUISETUM:- <i>Psilotum</i> , <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> .
4-3	TELOME THEORY AND STELAR EVOLUTION:- Telome Theory, Stelar Evolution.
4-4	HETEROSPORY AND SEED HABIT:- Importance of Heterospory, Origin of Heterospory, Heterospory and Seed Habit.
4-5	FOSSIL PTERIDOPHYTES (RHYNIA, PSILOPHYTON AND CALAMITES):- <i>Rhynia</i> , <i>Psilophyton</i> , <i>Calamites</i> .

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY012			
Text-Books			
BNY012-T01	Biology & Diversity of Algae, Bryophyta&Pteridophyta i. Dr. B. DigamberRao, ii. Dr. NirmalaBabuRao, iii. Prof. B. Rajkumar, iv. Dr. N. Saradamani, v. Dr. M. Venkaiah, vi. Prof. R. R. VentakataRaju	2007	Dr. B. R. Ambedkar Open University, Hydrabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY012 –RB1			
BNY012 –RB2			
BNY012 –RB3			
BNY012 –RB4			
BNY012 –RB5			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY012 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY012-WL1			

BNY013: GYMNOSPERMS, TAXONOMY OF ANGIOSPERMS & ANATOMY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(Botany)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY013	Gymnosperms, Taxonomy of Angiosperms and Anatomy	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B.Sc. with Botany or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to</p> <ul style="list-style-type: none"> Study Distribution, General Characteristics, Classification and Economic Importance of Gymnosperms Origin and Phylogeny of Angiosperms Identify Primary structure of root, stem and leaf

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05	Distribution, General Characteristics, Classification and Economic Importance of Gymnosperms Morphology and Anatomy of Cycadales, Ginkgoales, Coniferales, Taxales and Gnetales Reproductive Structure of Cycadales, Ginkgoales, Coniferales, Taxales and Gnetales Development of Male and Female Gametophytes Fossil Gymnosperms	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04	Fossil gymnosperms Origin and phylogeny of angiosperms Plant nomenclature Systems of classification	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04	Recent trends in plant taxonomy Biosystematics General account - ranales, centrospermae, amentiferae General account - tubiflorae, helobiales and poales	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

04-01	Flora and vegetation of Andhra Pradesh	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-02	Herbarium methodology		
04-03	Biodiversity and conservation		
04-04	Apical meristems of root and shoot		
04-05	Tissues and tissues system		
04-06	Primary structure of root, stem and leaf		
04-07	Secondary growth		
04-08	Wood anatomy		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	DISTRIBUTION, GENERAL CHARACTERISTICS, CLASSIFICATION AND ECONOMIC IMPORTANCE OF GYMNASPERMS: Introduction, Characteristics features of Gymnosperms, Antiquity and Origin of Gymnosperms, Fossil History of Gymnosperms of India, Distribution of Indian Gymnosperms, Indian work on Gymnosperms, General Characters of Gymnosperms, Economic Importance, Classification of Gymnosperms, Primitive and Advanced Characters of Gymnosperms, Living Fossils.	CR 01
1-2	MORPHOLOGY AND ANATOMY OF CYCADALES, GINKGOALES, CONIFERALES, TAXALES AND GNETALES: Introduction, Morphology and Anatomy of Vegetative Structures of Cycadales, Morphology and Anatomy of Vegetative Structures of Ginkgoales, Morphology of Vegetative Structures of Coniferales, Morphology of Vegetative Structures of Taxales, Anatomy of Coniferales and Taxales with special reference to wood structure, Morphology and Anatomy of Vegetative Structures of Gnetales.	
1-3	REPRODUCTIVE STRUCTURES OF CYCADALES, GINKGOALES, CONIFERALES, TAXALES AND GNETALES: Introduction, Male cones, Female cones, Pollination and Post Pollination in Gymnosperms.	
1-4	DEVELOPMENT OF MALE AND FEMALE GAMETOPHYTES(CYCADALES, GINKGOALES, CONIFERALES, TAXALES AND GNETALES): -Introduction, Development of Male Gametophyte, Development of Female Gametophyte, Archegonia in Gymnosperms, Pollination and Fertilization in Gymnosperms, Embryogeny, Seed Structure in Gymnosperms.	
2-1	FOSSIL GYMNASPERMS (PTERIDOSPERMALES, BENNETTITALES, PENTOXYLALES AND CORDAITALES): - Introduction, Pteridospermales, Bennettitales, Pentoxylales, Cordaitales.	CR 02
2-2	ORIGIN AND PHYLOGENY OF ANGIOSPERMS: -Introduction, Historical Account, Features Of Protoangiosperms, Hypothetical Primitive Angiosperm, Time And Place Of Origin, Diversification Of Protoangiosperms, Significance, Are Angiosperms Monophyletic Or Polyphyletic?, Conclusion, Future Studies.	
2-3	PLANT NOMENCLATURE: -Introduction, History Of Plant Nomenclature, Binominal Nomenclature, International Code Of Botanical Nomenclature (ICBN) .	
2-4	SYSTEMS OF CLASSIFICATION: -Introduction, Bentham And Hooker's System, Engler And Prantl's System, Hutchinson's System, Takhtajan's System, Cronquist's System, Dahlgren's System, Thorne's System.	
3-1	RECENT TRENDS IN PLANT TAXONOMY(ANATOMY, PALYNOLOGY, EMBRYOLOGY, CYTOLOGY, CHEMOTAXONOMY, NUMERICAL TAXONOMY AND MOLECULAR TAXONOMY): - Introduction, Anatomy In Relation To Taxonomy, Embryology In Relation To Taxonomy, Palynology, Cytology In Relation To Taxonomy, Chemotaxonomy, Numerical Taxonomy.	CR 03
3-2	BIOSYSTEMATICS: - Introduction, Methods Of Study Of Biosystematics, Mechanism Of Study Of Biosystematics, Objectives Of Biosystematics Categories, Recognition And Classification of Ecotypes, Ecotype And Taxonomy, Coenospecies, Comparium (Syngamodeme), Deme Terminology, Role Of Biosystematics, Species Concepts- Types Of Concepts.	
3-3	GENERAL ACCOUNT OF RANALES, CENTROSPERMAE AND AMENTIFERAEE: -Introduction, Ranales, Centrospermae, Amentiferae.	
3-4	GENERAL ACCOUNT OF ORDERS TUBIFLORAE, HELOBIALES AND POALES: -Introduction, Tubiflorae, Helobiales, Poales, Comparative Account Of The Families Of The Orders Of Tubiflorae, Helobiales And Poales.	
4-1	FLORA AND VEGETATION OF ANDHRA PRADESH: -Introduction, Flora Of Andhra Pradesh, Vegetation Types Of Andhra Pradesh.	CR 04
4-2	HERBARIUM METHODOLOGY: -Introduction, Functions Of A Herbarium, Kinds Of Herbaria, Important Herbaria Of The World And India, Making Herbarium, Arrangement And Maintenance	

	Of Herbarium.	
4-3	BIODIVERSITY AND CONSERVATION:- Introduction, Nature And Value Of Biodiversity, Biodiversity At Global And National Levels, Biogeographic Zones Of India, Threats To Biodiversity, Conservation Of Biodiversity.	
4-4	APICAL MERISTEMS OF ROOT AND SHOOT:- Introduction, Characteristics Of Meristematic Tissue, Classification Of Meristems, Vegetative Shoot Apex, Reproductive Shoot Apex, Root Apex.	
4-5	TISSUES AND TISSUE SYSTEMS:- Introduction, Parenchyma, Collenchyma, Sclerenchyma, Xylem, Phloem, Transfer Cells, Secretory Cells And Tissues, Tissue Systems.	
4-6	PRIMARY STRUCTURE OF ROOT, STEM AND LEAF:- Introduction, Primary Structure Of Root, Primary Structure Of Stem, Root Stem Transition, Primary Structure Of Leaf.	
4-7	SECONDARY GROWTH:- Introduction, Secondary Growth, Anomalous Secondary Growth In Stems, Anomalous Secondary Growth In Monocot Stems, Anomalous Secondary Growth In Dicotyledonous Roots.	
4-8	WOOD STRUCTURE:- Introduction, Macroscopic Characteristics Of Wood, Softwoods(Conifer Wood) And Hardwoods(Dicotyledon Wood), Components Of Wood, Axial And Ray Systems, Sectioning Planes Of Wood, Distribution Patterns Of Vessels: Diffuse Porous And Ring Porous Woods, Axial Wood Parenchyma, Distribution Patterns Of Axial Wood Parenchyma, Ray System, Cellular Organization Of Rays, Sapwood And Heartwood, Storied And Non Storied Woods, Reaction Wood, Growth Rings (Annual Rings), Dendrochronology, Secretory Structures Of Wood, Characteristics Features Of Wood, Salient Features Of Some Woods.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY013			
Text-Books			
BNY013-T01	Gymnosperms Taxonomy Of Angiosperms And Anatomy- i. Dr. H. Ramakrishnan, ii. Dr.B. Ravi Prasad Rao, iii. Dr. S.R. Shanmukharao, iv. Dr.S. Swarupa Rani, v. Prof. V.N.R. Verma, vi. Dr. K. Vijaya Kumar, vii. Dr. K. Yashodhara	2007	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY013 –RB1			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY013 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY013-WL1			

BNY014: BIOCHEMISTRY & PLANT PHYSIOLOGY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(Botany)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY014	Biochemistry and Plant Physiology	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with Botany or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to <ul style="list-style-type: none"> Study Principles of thermodynamics Define Plant water relations Study Photosynthesis and respiration process

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05 01-06 01-07 01-08	Principles Of Thermodynamics Enzymes Carbohydrates Lipids Amino Acids Proteins Nucleic Acids Structure And Function Of Membranes	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04	Plant Water Relations Mineral Nutrition Photosynthesis-I Photosynthesis-II	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04	Respiration-I Respiration-II Nitrogen And Sulphur Metabolism Plant Growth Regulators	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-01 04-02 04-03 04-04	Mechanism Of Hormonal Regulation Of Plant Growth And Development Physiology Of Flowering And Vernalisation Seed Dormancy And Germination Stress Physiology	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	PRINCIPLES OF THERMODYNAMICS :-Introduction, First Law Of Thermodynamics, Internal Energy, Enthalpy, Second Law Of Thermodynamics, Entropy, Heat Of Reaction.	CR 01
1-2	ENZYMES :-Introduction, Properties Of Enzymes, Co-Factors Of Enzymes, Nomenclature And Classification Of Enzymes, Catalysis And Energy Of Activation, Mechanism Of Enzyme Action, Michaelis- Menten Kinetics, Factors Affecting Rate Of Enzyme Reaction, Enzyme Regulation, Enzyme Inhibition, Isozymes Allosteric Enzymes.	
1-3	CARBOHYDRATES :-Introduction, Classification, Structural Aspects Of Monosaccharides, Glycosides, Oligosaccharides, Polysaccharides, Functions Of Carbohydrates, Glycoproteins.	
1-4	LIPIDS :-Introduction, Functions Of Lipids, Classification Of Lipids, Lipid Mobilization- Conversion Of Lipids To Carbohydrates, B-Oxidation, Glyoxylate Cycle, Fatty Acid Biosynthesis, Assembly Of Glycerolipids.	
1-5	AMINO ACIDS :-Introduction, General Structure And Properties, Peptide Bonds, Classification, Biosynthesis Of Amino Acids: G.S, GOGAT, Regulation.	
1-6	PROTEINS :-Introduction, Classification Of Proteins, Structure Of Proteins, Isolation And Purification Of Proteins, Procedure Of Column Chromatography.	
1-7	NUCLEIC ACIDS :-Introduction,Classification And Chemical Composition, Nucleic Acides And Nucleosides, DNA- Chemistry And Structure, RNA-Chemistry And Structure, Composition Of DNA And RNA, DNA-Replication And Transcription, Mechanism Of Protein Synthesis.	
1-8	STRUCTURE AND FUNCTION OF MEMBRANES :- Introduction, Chemical Composition Of Membranes- Lipids, Chemical Composition Of Membranes-Proteins, Structure- Earlier Membrane Models, Structure- Fluid Mosaic Model, Functions Of Membranes.	
2-1	PLANT WATER RELATIONS :-Introduction, Plant Cell Water Relations, SPAC Concept, Structure Of Stomata And The Mechanism Of Their Movement.	CR 02
2-2	MINERAL NUTRITION :-Introduction, Mineral Nutrients, Ion Uptake.	
2-3	PHOTOSYNTHESIS-I :- Introduction, History Of Photosynthesis, Light Energy And Photosynthesis, Light Absorption, Structure Of Chloroplast, Mechanism Of Light Reactions, Cyclic Electron Transport, ATP Synthesis In Chloroplasts, Use Of Inhibitors And Electron Acceptors.	
2-4	PHOTOSYNTHESIS-II :-Introduction, Photosynthetic Carbon Reduction, Photorespiration And Its Significance, Carbon Reduction In C ₄ Plants, Crassulacean Acid Metabolism (CAM), Synthesis Of Starch And Source.	
3-1	RESPIRATION-I :-Introduction, Respiratory Quotient, Structure Of Mitochondria, Overview Of Respiration, Glycolysis, Pentose Phosphate Pathway.	CR 03
3-2	RESPIRATION-II :-Introduction, Fate Of Pyruvate, Fermentation, Aerobic Respiration, Electron Transport System And Oxidative Phosphorylation, Plant Mitochondria Possess Additional Electron Transport-Enzymes, Cyanide Resistant Respiration.	
3.3	NITROGEN AND SULPHUR METABOLISM :-Introduction, Biological Nitrogen Fixation, Nitrate Reduction, Biosynthesis Of Proteins, Uptake And Reduction Of Sulphate.	
3.4	PLANT GROWTH REGULATORS :-Introduction, Functions Of Plant Growth Regulators, Applications Of Plant Growth Regulators.	
4-1	MECHANISM OF HORMONAL REGULATION OF PLANT GROWTH AND DEVELOPMENT :-Introduction, Hormone Receptors, Second Messengers, Amplification Of Protein Kinases, Model For Hormone Action.	CR 04
4-2	PHYSIOLOGY OF FLOWERING :-Introduction, Photoperiodism, Phytochrome, Vernalization.	
4-3	SEED DORMANCY AND GERMINATION :- Introduction, Seed Germination, Process Of Imbibition, Formation Or Activation Of Enzyme Systems, Metabolism Of Storage Products, Mobilization Of	

	Reserve Food Material, Seed Dormancy, Coat Imposed Dormancy, Requirement Of Light, Temperature, Germination Inhibitors, Hormones.	
4-4	STRESS PHYSIOLOGY :-Introduction, Water Deficit/Drought Stress, Temperature Stress, Salt Stress, Heavy Metal Stress.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY014			
Text-Books			
BNY014-T01	Biochemistry & Plant Physiology i. Prof. S. Gangadharrao, ii. Prof. G. Rama Gopal, iii. Prof. S. Seetaramarao, iv. Dr. I. Subrahmanyam, v. Dr. B. Sujatha, vi. Dr. J. Ushakumari, vii. Dr. S. Vasantha Pillai	2007	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY014 –RB1			
BNY014 –RB2			
BNY014 –RB3			
BNY014 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY014 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY014-WL1			

BNY015: BIOLOGY & DIVERSITY OF VIRUSES, BACTERIA & FUNGI (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY015	Biology and diversity of Viruses, Bacteria and Fungi	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B. Sc. with BOTANY or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to <ul style="list-style-type: none"> Methods of Sterilization Preparation of Media Culturing Methods Staining Techniques-

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05 01-06 01-07 01-08 01-09	Methods of Sterilization Preparation of Media Culturing Methods Staining Techniques Symptoms of Some Viral and Mycoplasmal Diseases Models of Bacteriophage and HIV Tansmission of Virus Diseases Isolation and Enumeration of Bacteria from Soil and Water Observation of Symptoms of Plant Diseases Caused by Bacterial Pathogens	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04 02-05	Isolation of Fungi From Soil ,Water, Litter and Air Identification of Fungal Cultures Slides and Specimens-I Identification of Fungal Cultures Slides and Specimens-II Identification of Fungal Cultures Slides and Specimens-III Mycorhizal Colonization in Roots of Parthenium and Tagetes	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

02-06	Morphology of Plant Pathogens		Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-07	Study of Symptoms of Fungal Diseases		
02-08	Morphology of Button Oyster, paddy Straw Mushrooms and Amanita		
02-09	Identification of Ectomycorrhizal Fungi		
02-10	Genetics of Fungi (<i>Neurospora aesculi</i>)		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
01-01	Methods Of Sterilization -In This Unit You Will Study Various Methods Of Sterilization.	CR 01
01-02	Preparation Of Media -In This Unit You Will Study The Preparation Of Different Media For Cutting The Microorganism	
01-03	Culturing Methods -In This Unit You Will Study About The Use And Care Of Microscope And Various Types Of Culturing Methods.	
01-04	Staining Techniques -In This Unit You Will Study About The Acidic And Basic Dyes And Various Staining Techniques	
01-05	Symptoms Of Some Viral And Mycoplasmal Diseases -In This Unit You Will Study The Symptoms Caused By Some Viral And Mycoplasmal Diseases, Their Causal Organisms, Control Measures Etc.	
01-06	Models Of Bacteriophage And HIV -In This Unit You Will Study The Models Of Bacteriophage And HIV	
01-07	Transmission Of Virus Diseases - In This Unit You Will Study Various Types Of Viral Transmission Such As Mechanical, Grafting, Dodder, Seed Or Pollen, Insects, Fungi, Etc.	
01-08	Isolation And Enumeration Of Bacteria From Soil And Water -In This Unit You Will Study Isolation And Enumeration Of Bacteria From Soil And Water By Serial Dilution Plate Method.	
01-09	Observation Of Symptoms Of Plant Diseases Caused By Bacterial Pathogens -In This Unit You Will Study Symptoms Of Plant Diseases Caused By Bacteria	
02-01	Isolation Of Fungi From Soil ,Water, Litter And Air -In This Unit You Will Study The Procedures Of Isolation Of Fungi From Soil ,Water, Litter And Air	CR 02
02-02	Identification Of Fungal Cultures Slides And Specimens-I -In This Unit You Will Study The Morphology Of The Fungal Organism <i>Achlya</i> , <i>Allomyces</i> , <i>Rhizopus</i> , <i>Mucor</i> , <i>Pilobolus</i> , <i>Emericella</i> , <i>Erysiphae</i> , <i>Chaetomium</i> , <i>Pleospora</i> And <i>Claviceps</i> .	
02-03	Identification Of Fungal Cultures Slides And Specimens-II -In This Unit You Will Study The Occurrence, Morphology, And Ascocarp Structure Of <i>Peziza</i> , <i>Morchella</i> , <i>Cyathus</i> , <i>Polyporus</i> , <i>Amanita</i> , <i>Glanoderma</i> , <i>Lycoperdon</i> .	
02-04	Identification Of Fungal Cultures Slides And Specimens-III -In This Unit You Will Study The Cultural And Identification Characters Of Some Common Soil Fungi Viz., <i>Alernaria</i> , <i>Aspergillus</i> , <i>Colletotricum</i> , <i>Curvalaria</i> , <i>Drechslera</i> , <i>Fusarium</i> , <i>Penicillium</i> And <i>Phoma</i> .	
02-05	Mycorhizal Colonization In Roots Of Parthenium And Tagetes -In This Unit You Will Study The Root Sample Of AM Fungi Based On Clearing And Staining Of The Root Samples. You Will Also Calculate The Percentage Of VAM Infection In Roots Of Parthenium And Tagetes And AM Fungal Spore Count Will Be Recorded.	
02-06	Morphology Of Plant Pathogens - In This Unit You Will Study Some Important Pathogenic Fungi, Their Symptoms And Fungal Morphology Through Transverse Section Of Infected Plant Parts.	
02-07	Study Of Symptoms Of Fungal Diseases -In This Unit You Will Study The Host Range Of White Rust, Symptoms Caused By Fungal Organisms <i>Albugo</i> , Downy Mildew Of Grapes Etc.	
02-08	Morphology Of Button Oyster, Paddy Straw Mushrooms And Amanita -In This Unit You Will Study The Morphology Of Mushrooms Like Button Oyster, Paddy Straw Mushrooms And	

	Amanita.	
02-09	Identification Of Ectomycorrhizal Fungi -In This Unit You Will Study The Occurrence, Important And Morphological Identification Characters Of Ectomycorrhizal Fungi.	
02-10	Genetics Of Fungi (<i>Neurospora</i>) -In This Unit You Will Study The Habit And The Identification Characters Of AM Fungi.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY015			
Text-Books			
BNY015-T01	Laboratory Manual and Record-Biology and Diversity of Viruses, Bacteria, and Fungi i. Prof. B. Badraiah ii. Prof. G. Bhagyanarayana iii. Prof. K.V. Mallaiah iv. Prof. K. Murugesan v. Dr. A. Nagamani vi. Dr. K.V.B.R. Tilak	2008	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY015 –RB1			
BNY015 –RB2			
BNY015 –RB3			
BNY015 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY015 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY015-WL1			

BNY016: BIOLOGY & DIVERSITY OF ALGAE, BRYOPHYTA & PTERIODOPHYTA (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY016	Biology and Diversity of Algae, Bryophyta and Pteriodophyta	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with BOTANY or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to study- <ul style="list-style-type: none"> Preparation of Cultures Media for Micro Algae Preparation of Herbarium for Macro Algae

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05	<i>Nostoc, Lyngbya, Spirulina and Tolypothrix</i> <i>Clamydomonas, Volvox, Chlorella and Ulva</i> <i>Enteromorpha, Oedogonium, Cosmarium and Caulerpa</i> <i>Ectocarpus, Dictyota and Sargassum</i> <i>Gelidium, Gracilaria, Cyclotella, and Navicula</i>	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

01-06	Collection and Identification of Algae in and Around Local Area		Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-07	Observation of Algal Blooms and Bioindicators of Water Quality		
01-08	Preparation of Cultures Media for Micro Algae		
01-09	Preparation of Herbarium for Macro Algae		
02-01	<i>Marchantia, and Targionia,</i>	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-02	<i>Plagiochasma and Fimbriaria</i>		
02-03	<i>Pelia and Porella</i>		
02-04	<i>Anthoceros and Notothylas</i>		
02-05	<i>Funaria and Polytrichum</i>		
02-06	<i>Lycopodium and Selaginella</i>		Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-07	<i>Psilotum and Isoetes</i>		
02-08	<i>Osmunda and Gleichenia</i>		
02-09	<i>Ophioglossum and Adiantum</i>		
02-10	<i>Marsilea, Salvinia and Azolla</i>		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
01-01	<i>Nostoc, Lyngbya, Spirulina And Tolypothrix</i> -In This Unit You Will Study The Characters For The Identification Of <i>Nostoc, Lyngbya, Spirulina And Tolypothrix</i>	CR 01
01-02	<i>Clamydomonas, Volvox, Chlorella And Ulva</i> -In This Unit You Will Study The Habit, Habitat, Structure And Reproductive Characters Of <i>Clamydomonas, Volvox, Chlorella And Ulva</i>	
01-03	<i>Enteromorpha, Oedogonium, Cosmarium And Caulerpa</i> - In This Unit You Will Study The Habit, Habitat, Structure And Reproductive Characters Of <i>Enteromorpha, Oedogonium, Cosmarium And Caulerpa</i>	
01-04	<i>Ectocarpus, Dictyota And Sargassum</i> -In This Unit You Will Study The Habit, Habitat, Structure And Reproductive Characters Of <i>Ectocarpus, Dictyota And Sargassum</i>	
01-05	<i>Gelidium, Gracilaria, Cyclotella, And Navicula</i> -In This Unit You Will Study The Habit, Habitat, Structure And Reproductive Characters Of <i>Gelidium, Gracilaria, Cyclotella, And Navicula</i> .	
01-06	Collection And Identification Of Algae In And Around Local Area -In This Unit You Will Study The Collection And Identification Of Locally Available Fresh Water Algae.	
01-07	Observation Of Algal Blooms And Bioindicators Of Water Quality -In This Unit You Will Study About Algal Blooms And Bioindicators Of Water Quality.	
01-08	Preparation Of Cultures Media For Micro Algae -In This Unit You Will Study Preparation Of Culture Media For Micro Algae	
01-09	Preparation Of Herbarium For Macro Algae -In This Unit You Will Study The History Of Herbarium, Importance Of Herbarium Preparation And Preservation Of Herbarium.	
02-01	<i>Marchantia, And Targionia</i> -In This Unit You Will Study The Classification, Identification And Life Cycle Of <i>Marchantia And Targionia</i> .	CR 02
02-02	<i>Plagiochasma And Fimbriaria</i> - In This Unit You Will Study The Classification, Morphology, And Life Cycle Of <i>Plagiochasma And Fimbriaria</i>	
02-03	<i>Pelia And Porella</i> -In This Unit You Will Study The Classification, Morphology, And Life Cycle Of <i>Plagiochasma And Fimbriaria</i>	
02-04	<i>Anthoceros And Notothylas</i> -In This Unit You Will Study Morphology Of <i>Anthoceros And Notothylas</i> Besides T.S. Of Thallus, Antheridia, Archegonia, Sprophyte And L.S. Of Sporophyte.	
02-05	<i>Funaria And Polytrichum</i> -In This Unit You Will Study The Morphology And Anatomy Of T.S. Of Stem, T.S. Of Lef, Antheridia, Archegonia And L.S. Of Capsule Of <i>Funaria And Polytrichum</i> .	
02-06	<i>Lycopodium And Selaginella</i> -In This Unit You Will Study The External Morphology Of The	

	Sporophyte, Anatomy Of Stem, Leaf And L.S. Of Sori Of Lycopodium And Selaginella.	
02-07	Psilotum And Isoetes -In This Unit You Will Study The External Morphology Of The Sporophytic Plants, Anatomy Of Rhizome, Stem, Leaf And Sporangia Of <i>Psilotum</i> And <i>Isoetes</i> .	
02-08	Osmunda And Gleichenia -In This Unit You Will Study The Morphology, Anatomy And Reproductive Characters Of <i>Osmunda</i> And <i>Gleichenia</i>	
02-09	Ophioglossum And Adiantum -In This Unit You Will Study The External Morphology Of The <i>Ophioglossum</i> And <i>Adiantum</i> Besides T.S. Root, T.S. Rhizome, T.S. Of Petiole And Fertile Spike Of <i>Ophioglossum</i> And T.S. Rhizome, T.S. Petiole, Structure Of Sporangia And Thallus Of <i>Adiantum</i> .	
02-10	Marsilea -In This Unit You Will Study The Morphology And Anatomy Of The Rhizome, Petiole Sporocarp Of <i>Marsilea</i>	
02-11	Salvinia And Azolla -In This Unit You Will Study The External Morphology Of The Sporophyte, Anatomy Of Vegetative And Reproductive Parts Of <i>Salvinia</i> And <i>Azolla</i> .	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY016			
Text-Books			
BNY016-T01	Laboratory Manual and Record-Biology and Diversity of Algae, Bryophyta and Pteridophyta i. Dr. Nirmala Babu Rao ii. Prof. B. Rajkumar iii. Dr. N. Saradhamani iv. Dr. M.V. Enkaiah v. Prof. R. R. Ventakata Raju	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY016 –RB1			
BNY016 –RB2			
BNY016 –RB3			
BNY016 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY016 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY016-WL1			

BNY017: GYMNOSPERMS, TAXONOMY & ANATOMY OF ANGIOSPERMS (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY017	gymnosperms, taxonomy and anatomy of angiosperms	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with BOTANY or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to study <ul style="list-style-type: none"> Zamia and Ginkgo Thuja and Pinus Araucaria and Taxus Ephedra and Gnetum

UNITS

UN	Name of the Unit	CSs	Questions
01-01	<i>Zamia and Ginkgo</i>	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-02	<i>Thuja and Pinus</i>		
01-03	<i>Araucaria and Taxus</i>		
01-04	<i>Ephedra and Gnetum</i>		
01-05	<i>Lyginopteris</i>		
01-06	<i>Medullosa</i>		
01-07	<i>Ptilophyllum and Glassopteris</i>		
01-08	<i>Pentoxylon</i>		

02-01	Study Of The Locally Available Plants And Recording Of The Intraspecific Variation	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-02	Description And Identification At Family, Genus And Species Levels Using Floras-I		
02-03	Description And Identification At Family, Genus And Species Levels Using Floras-II,		
02-04	Identification Of Key Characters In A Group Of Species Of A Genus		
02-05	Construction Of Indented And Bracketed Keys For The Given Material		
02-06	Nomenclatural Problems		
02-07	Herbarium Techniques		
02-08	Study Of Meristematic And Permanent Tissues And Tissue Systems		Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-09	Secondary Growth In Roots And Stems		
02-10	Leaf Anatomy		
02-11	Anomalous Secondary Growth		
02-12	Wood Structure		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit (Application Oriented problems)	CR
01-01	ZamiaAnd Ginkgo - In This Unit, You Will StudyThe Morphology And Anatomy Of Vegetative And Reproductive Structures Of <i>Zamia</i> And <i>Ginkgo</i>	CR 01
01-02	PinusAnd Thuja -In This Unit, You Will StudyThe Morphology And Anatomy Of Vegetative And Reproductive Structures <i>Pinus</i> And <i>Thuja</i>	
01-03	Araucaria And Taxus -In This Unit, You Will StudyThe Morphology, Anatomy And Of Reproductive Structures <i>Araucaria</i> And <i>Taxus</i>	
01-04	EphedraAnd Gnetum -In This Unit, You Will StudyThe Morphology And Anatomy Of Vegetative And Reproductive Structures <i>Ephedra</i> And <i>Gnetum</i>	
01-05	Lyginopteris -In This Unit, You Will StudyThe Morphology, Anatomy And Of Reproductive Structures Of Fossil Plants <i>Lyginopteris</i>	
01-06	Medullosa -In This Unit, You Will StudyThe Morphology Of <i>Medullosa</i> Stem And Leaf And The Anatomy Of <i>Medullosa</i> Stem.	
01-07	PtilophyllumAnd Glassopteris -In This Unit, You Will StudyThe Morphology Of The Fossil Leaf Form <i>Ptilophyllum</i> Cutchense And <i>Glassopteris</i>	
01-08	Pentoxylon -In This Unit, You Will Study And Observe The Fossil Specimens Of Leaf, Stem, Seed-Bearing And Pollen- Bearing Organs Of <i>Pentoxylon</i> .	
02-01	Study Of The Locally Available Plants And Recording Of The Intraspecific Variation - In This Unit, You Will Study Different Technical Terms,Understand Them, In Order To Describe An AngiospermicPlant	CR 02
02-02	Description And Identification At Family, Genus And Species Levels Using Floras-I - In This Unit, You Will Study The Vegetative And Floral Characters Of <i>Cleome Viscosa</i> (Capparidaceae), <i>CorchorusAestuans</i> (Tiliaceae) <i>TribulusTerrestris</i> (Zygophyllaceae), <i>TephrosiaPurpurea</i> (Leguminaceae), <i>MollugoNudicaulis</i> (Aizoaceae) <i>TridaxProcumbens</i> (Asteraceae), <i>CatharanthusRoseus</i> (Apocynaceae)	
02-03	Description And Identification At Family, Genus And Species Levels Using Floras-II - In This Unit You Will Study The Vegetative And Floral Characters Of <i>EvolvulusAlsinoides</i> Of The Family Convolvulaceae. <i>TecomaStans</i> Of The Family Bignoniaceae, <i>LeucasAspera</i> Of The Family Lamiaceae, <i>AchyranthusAspera</i> Of The Family Amaranthaceae, <i>Euphorbia Heterophylla</i> Of The Family Euphorbiaceae, <i>Allium Cepa</i> Of The Family LiliaceaeAnd <i>ChlorisBarbata</i> Of The Family Poaceae.	
02-	Identification Of Key Characters In A Group Of Species Of A Genus -In This Unit, You Will Study	

04	The Identification Of Genus, Deciduous Plants Without Leaves And Apetalous Plants Without Perianth.	
02-05	Construction Of Indented And Bracketed Keys For The Given Material- In This Unit, You Will Study The Construction Of Indented And Bracketed Keys For The Given Material.	
02-06	Nomenclatural Problems- In This Unit, You Will Study The Practical Application Of Principles, Rules And Recommendations Of The ICBN.	
02-07	Herbarium Techniques- In This Unit, You Will Study And Know, What Is Herbarium Is, Besides You Know Methods To Collect, Preserve, Mounting, Labeling Of Plant Collected Etc.	
02-08	Study Of Meristmatic And Permanent Tissues And Tissue Systems- In This Unit You Will Study Various Tissues Systems Of Plants With The Help Of Freshly Prepared Sections As Well As Permanent Slides.	
02-09	Secondary Growth In Roots And Stems- In This Unit You Will Study The Normal Secondary Growth Of A Dicot Root And Dicot Stem.	
02-10	Leaf Anatomy- In This Unit You Will Study The Leaf Anatomy Of Some Plants.	
02-11	Anomalous Secondary Growth- In This Unit You Will Study The Primary And Anomalous Secondary Structures Of Some Plants.	
02-12	Wood Structure- In This Unit You Will Study Of Different Woods.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY017			
Text-Books			
BNY017-T01	Laboratory manual and record -Gymnosperms Taxonomy and Anatomy of Angiosperms i. Dr. H. Ramakrishna ii. Dr. B. Ravi Prasad Rao iii. Dr. S.R. Shanmukha Rao iv. Dr. S. Swarupa Rani v. Prof. Y. N. R. Varma vi. Prof. S. Venkata Ratnam vii. Dr. K. Vijaya Kumar viii. Dr. K. Yashodhara	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY017 –RB1			
BNY017 –RB2			
BNY017 –RB3			
BNY017 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY017 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY017-WL1			

BNY018: BIOCHEMISTRY & PLANT PHYSIOLOGY (PRACTICAL)

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY018	BIOCHEMISTRY AND PLANT PHYSIOLOGY	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B.Sc. with BOTANY or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to study</p> <ul style="list-style-type: none"> Estimation of Amino acids by NInhydrin Method Determination of Iodine Number of Edible Oils Separation of Chloroplast Pigments by Solvents Extraction Method

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04	Estimation of Fructose by Resorcinol Method Estimation of Aminoacids by Ninhydrin Method Estimation of Protein by Biuret Method Separation and Identification of Aminoacids by using TLC Method	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-05 01-06 01-07 01-08	Determination of Amylase Activity Determination of Catalase Activity Estimation of Reducing Sugars Determination of Iodine Number of Edible Oils		
02-01 02-02 02-03 02-04 02-05 02-06	Determination of Water Potential using Gravimetric Method Effects of Temperature on Membrane Permeability Determination of Total and Titrable Activity Determination of Stomata Frequency and Index Stomatal Response to Promoters and Inhibitors Separation of Chloroplast Pigments by Solvents Extraction Method	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

02-07	Determination of Absorption Spectra of Chlorophylls		
02-08	Estimation of Chlorophyll-a, Chlorophyll-b and Total		
02-09	Chlorophyll in Leaves of C₃ and C₄ plants		
02-10	Determination of Rate of Respiration of Germinating seeds by Continuous Current Method		
02-11	Estimation of Nitrogen by Micro-Kjeldahl's Method		
02-12	Estimation of Indole Acetic Acid(IAA),		
02-13	Determination of Seeds Viability		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
01-01	Estimation Of Fructose By Resorcinol Method -To Estimate Fructose Content In The Test Solution Of Solution Of Unknown Concentration Using Resorcinol Method.	CR 01
01-02	Estimation Of AminoacidsBy Ninhydrin Method -To Estimate The Content Of Aminoacids By Ninhydrin Method.	
01-03	Estimation Of Protein By Biruet Method -To EstimateOf Protein By Biruet Method	
01-04	Separation And Identification Of AminoacidsBy Using TLC Method - In This Experiment, You Will Learn How To Separate And To Indentify The Aminoacids Present In The Mixture By Using Thin Layer Chromatography.	
02-01	Determination Of Amylase Activity - To Learn The Effects Of Substrate Concentration On The Activity Of The Enzyme Amylase	
02-02	Determination Of Catalase Activity -To Determine The Activity Of The Enzyme Catalase In The Given Plant Material.	
02-03	Estimation Of Reducing Sugars -In This Unit You Will Learn To Estimate The Content Of Reducing Sugars In The Given Fruit.	
02-04	Determination Of Iodine Number Of Edible Oils - To Determine The Iodine Number Of The Given Oil.	
03-01	Determination Of Water Potential Using Gravimetric Method -To Estimate The Water Potential Of The Given Plant Material By Using A Gravimetric Method.	CR 02
03-02	Effects Of Temperature On Membrane Permeability -To Demonstrate The Effect Of Temperature On Membrane Permeability	
03-03	Determination Of Total And Titrable Acidity -To Estimate The Total And Titrable Acidity In The Given Leaf Material.	
03-04	Determination Of Stomata Frequency And Index -To Determine The Stomatal Frequency And Index Of Selected Leaves In A Given Plant Species.	
03-05	Stomatal Response To Promoters And Inhibitors - ToStudy The Stomatal Opening And Closing Mechanism In Response To Promoters And Inhibitors.	
03-06	Separation Of Chloroplast Pigments By Solvents Extraction Method - To Separate The Chloroplast Pigments Into Four Groups By Solvent Extraction Method.	
04-01	Determination Of Absorption Spectra Of Chlorophylls - In This Unit You Will Determine The Absorption Of Spectra Of The Chlorophylls.	
04-02	Estimation Of Chlorophyll-A, Chlorophyll-B And Total Chlorophyll In Leaves Of C₃And C₄ Plants -To Estimate The Chlorophyll A, Chlorophyll-B And Total Chlorophyll Content In Leaves Of C ₃ And C ₄ Plants	
04-03	Determination Of Rate Of Respiration Of Germinating Seeds By Continuous Current Method -To Determine The Rate Of Respiration Of Plant Materials Like Germinating Seeds By Continuous Current Method	
04-04	Estimation Of Nitrogen By Micro-Kjeldahl's Method -To Estimate The TotalNitrogen Content Of The Selected Plant Samples By Micro-Kjeldahl's Method	
04-05	Estimation Of Indole Acetic Acid(IAA) -To Prepare Standard Graph Of IndoleAcetic Acid And To Calculate The Amount Of IAA Present In The Given Unknown Sample.	
04-06	Determination Of Seeds Viability -To Determine The Viability Of A Given Seed Sample Using TriphenylTetrazolium Chloride (TTC) Solution.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
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Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY018			
Text-Books			
BNY018-T01	Laboratory manual and record- Biochemistry and Plant Physiology i. Prof. S. GangadharRao ii. Prof. G. RamaGopal iii. Dr. I. Subrahmanyam iv. Dr. B. Sujatha v. Dr. J. Usha kumara vi. Dr. S. Vasantha Pillai	2008	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY018-RB1			
BNY018 -RB2			
BNY018 -RB3			
BNY018 -RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY018 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY018-WL1			

YEAR II

BNY021: CELL BIOLOGY, GENETICS, BIOSTATISTICS & ECOLOGY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY021	Cell Biology, Genetics, Biostatistics & Ecology	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with Botany or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to know <ul style="list-style-type: none"> Brief overview of Mendelian Inheritance Application of computers in biology Cell cycle and apoptosis

UNITS

UN	Name of the Unit	CR	Questions
01-01 01-02 01-03 01-04 01-05	Principles And Application Of Light, Phase Contrast, Fluorescence And Electron Microscopy Ultra Structure And Function Of Plant Cell And Organelles Chromosome Special Types Of Chromosomes Cell Cycle And Apoptosis	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04 02-05	DNA Genetic Code Brief Overview Of Mendelian Inheritance Chromosomal Aberrations Mutations	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02	Mean Variance Application Of Computers In Biology	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

04-01	Principles, Concepts And Levels Of Ecology	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-02	Community Characteristics		
04-03	Biodiversity		
04-04	Ecosystem		
04-05	Global Biogeochemical Cycles Of C, N₂, P And S		
04-06	Climate, Soil, Vegetation Pattern Of India		
04-07	Climate Change And Greenhouse Gases		
04-08	Environmental Pollution		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	PRINCIPLES AND APPLICATION OF LIGHT, PHASE CONTRAST, FLUORESCENCE AND ELECTRON MICROSCOPY:- Introduction, Light Microscope, Phase Contrast Microscope, Fluorescence Microscope, Electron Microscope.	CR 01
1-2	ULTRA STRUCTURE OF A CELL AND ITS ORGANELLES:- Introduction, Cell Wall, Plasma Membrane, Lysosomes, Endoplasmic Reticulum, Peroxisomes, Glyoxysomes, Golgi Apparatus, Vacuoles, Mitochondria, Chloroplasts, Ribosomes, Plasmodesmata.	
1-3	CHROMOSOME:- Introduction, Morphology Of Chromosomes, Chemical Composition, Models Of DNA Folding, Euchromatin And Heterochromatin.	
1-4	SPECIAL TYPES OF CHROMOSOMES:- Introduction, Salivary Gland Chromosomes, Lampbrush Chromosomes, B- Chromosomes Or Accessory Chromosomes.	
1-5	CELL CYCLE AND APOPTOSIS:- Introduction, Cell Cycle, Control Of The Cycle, Mechanism Of Cell Cycle Control, Checkpoints, Reasons For PCD, Changes In Cells Involved In PC, Genes Controlling Apoptosis, Mechanism Of Apoptosis, Regulation Of Apoptosis, Signals For Apoptosis, Cell Survival Signals.	
2-1	DNA:- Introduction, Important Features Of DNA, The Chemistry Of DNA, The Watson- Crick Model Of DNA, Replication Of DNA, Genetic Recombination In Bacteria.	CR 02
2-2	GENETIC CODE:- Introduction, Transcription, The Genetic Code, Mechanism Of Protein Synthesis.	
2-3	BRIEF OVERVIEW OF MENDELIAN INHERITANCE:- Introduction, Mendel's Experiments, Modification Of 3:1 Phenotypic Ratio, Linkage, Chromosome Mapping.	
2-4	CHROMOSOMAL ABERRATIONS:- Introduction, Numerical Aberrations, Structural Aberrations.	
2-5	MUTATIONS:- Introduction, Brief History Of Mutations, Types Of Mutations, Mutation Rates And Frequencies, Discovery Of Mutagenesis, Nature Of Mutagens, Detection Of Mutations, Molecular Basis Of Gene Mutations, Frame Shift- Mutations, Insertion Mutations, Deletion Mutations, Spontaneous Gene Mutations, Induced Mutations, Physical Mutagens, Chemical Mutagens, DNA Repair Systems, Some Useful Mutagens.	
3-1	MEAN VARIANCE:- Introduction, Probability, Chi- Square Test, Numerical Descriptive Measures, Students 'T' Test, Analysis Of Variance.	CR 03
3-2	APPLICATIONS OF COMPUTERS IN BIOLOGY:- Introduction, Use Of Word And Power Point In The Preparation And Presentation Of Documents, Use Of Internet And World Wide Web, Basic Concepts Of Bioinformatics.	
4-1	PRINCIPLES, CONCEPTS AND LEVELS OF ECOLOGY:- Introduction, Basic Concepts Of Ecology, Levels Of Organization, Community Dynamics.	CR 04
4-2	COMMUNITY CHARACTERISTICS:- Introduction, Raunkiaer's Concept Of Life Forms, Braun Blanquet Scheme, Plant Communities.	
4-3	BIODIVERSITY:- Introduction, Biodiversity- Concept, Value Of Biodiversity, Biodiversity At International And National Level, Threats To Biodiversity, Conservation Of Biodiversity, Sustainable Development.	

4-4	ECOSYSTEM :-Introduction, Ecosystem Structure, Ecosystem Organization, Functioning Of Ecosystems, Ecological Efficiency.	
4-5	GLOBAL BIOGEOCHEMICAL CYCLES :- Introduction, Biogeochemical Cycles- Global, Carbon Cycle, Nitrogen Cycle, Phosphorous Cycle, Sulphur Cycle.	
4-6	CLIMATE, SOIL, VEGETATION PATTERN OF INDIA :-Introduction, Climatology, Phytogeography, Climate, Soil And Vegetation Types Of India.	
4-7	CLIMATE CHANGE AND GREEN HOUSE GASES :-Introduction, Climate Change, The Greenhouse Effect, The Greenhouse Gases, Sources, Trends And Roles, The Ozone Layer, The Ozone Hole, Consequences Of Climate Change.	
4-8	ENVIRONMENTAL POLLUTION : -Introduction, Types Of Pollution, Air Pollution, Water Pollution, Soil Pollution, Noise Pollution.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY021			
Text-Books			
BNY021-T01	CELL BIOLOGY, GENETICS, BIOSTATISTICS & ECOLOGY i. Prof. B.Subba Rao ii. Prof. M. Singara Charya iii. Prof. Mary Esther Cynthia iv. Prof. N.Ramaswamy v. Dr. B. Venkateshwar Rao vi. Dr. V.Rattan Kumar vii. Dr. Saraswati Rao viii. Dr. S.K.Balachander	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY021 –RB1			
BNY021 –RB2			
BNY021 –RB3			
BNY021 –RB4			
BNY021 –RB5			
BNY021 –RB6			
BNY021 –RB7			
BNY021 –RB8			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY021 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY021-WL1			

BNY022: MEDICINAL PLANTS & EMBRYOLOGY OF ANGIOSPERMS

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY022	MEDICINAL PLANTS AND EMBRYOLOGY OF ANGIOSPERMS	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B.Sc. with Botany or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to study</p> <ul style="list-style-type: none"> Conservation of medicinal plants Structure of anther and development of male gametophyte Structure of ovule and development of female gametophyte

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05 01-06 01-07 01-08	Role Of Plants In Medicine, Origin And Development And Different Systems Of Medicine. General Account Of Phytochemistry Of Medicinal Plants Morphology, Active Principles And Medicinal Value-I Morphology, Active Principles And Medicinal Value-II Cultivation Of Medicinal Plants Pharmacognosy And Adulteration Of Plant Drugs Ethno botany- History, Scope And Importance Conservation Of Medicinal Plants	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04	Structure Of Anther And Development Of Male Gametophyte Structure Of Ovule And Development Of Female Gametophyte Fertilization Sexual Incompatibility	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04	Development Of Endosperm Development Of Embryo Apomixes Polyembryony	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

04-01	Parthenocarpy	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-02	Experimental Embryology		
04-03	Applications Of Embryology In Taxonomy, Agriculture And Horticulture		
04-04	Principles And Applications Of Palynology		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	Role Of Plants In Medicine, Its Origin And Development And Different Systems Of Medicine:- Role Of Plants In Medicine, Origin Of Medicine, Origin And Development Of Traditional System Of Medicine.	CR 01
1-2	GENERAL ACCOUNT OF PHYTOCHEMISTRY OF MEDINAL PLANTS:- Introduction, Classification Of Crude Drugs Based On Phytochemicals, Phytochemicals Or Chemical Compounds Of Plant Origin, Chemodemes Or Chemical Races, Importance Of Phytochemicals In Modern Medicine.	
1-3	MORPHOLOGY, ACTIVE PRINCIPLES AND MEDICINAL VALUE-I:- Introduction, <i>Rauvolfia Serpentine</i> , <i>ChlorophytumBorvilianum</i> , <i>WithaniaSomnifera</i> , <i>Cassia Angustifolia</i> .	
1-4	MORPHOLOGY, ACTIVE PRINCIPLES AND MEDICINAL VALUE-II:- <i>EmbllicaOfficinalis</i> (<i>Phyllanthusemblica</i>), <i>Phyllanthusamarus</i> (<i>PhyllanthUsniruri</i>), <i>GymnemaSylvestre</i> , <i>Curcuma Longa</i> (Turmeric), <i>ZingiberOffinale</i> (Ginger).	
1-5	CULTIVATION OF MEDICINAL PLANTS:- Introduction, <i>Aloe Barbadensis</i> , <i>Coleus Forskohlii</i> , <i>AndrographisPaniculata</i> .	
1-6	PHARMACOGNOSY AND ADULTERATION OF PLANT DRUGS:- Introduction, History Of Pharmacognosy, Definition And Scope Of Pharmacognosy, Pharmacognostic Studies Of A Crude Drug, Adulteration Of Plant Drugs.	
1-7	ETHNOBOTANY- HISTORY, SCOPE AND IMPORTANCE:- Introduction, History Of Ethnobotany, Scope: Ethnobotany- An Interdisciplinary Approach, Importance Of Ethnobotany.	
1-8	CONSERVATION OF MEDICINAL PLANTS:- Introduction, Importance Of Plant Medicine, Demands For Herbal Medicines, Medicinal Plant Diversity And Exploitation, Medicinal Plants Conservation.	
2-1	STRUCTURE OF ANTHER AND DEVELOPMENT OF MALE GAMETOPHYTE:- Introduction, Anther Structure, Microsporogenesis, Development Of Male Gametophyte.	CR 02
2-2	STRUCTURE OF OVULE AND DEVELOPMENT OF FEMALE GAMETOPHYTE:- Introduction, Types Of Ovules, Ovule Intiation, Integuments, Aril, Arillode And Sarcotesta, Endothelium, Operculum, Caruncle Or Strophiole, Coma, Obturator, Nucellus, Pseudo- Embryo Sac, Hypostase And Epistase, Megasporeogenesis, Functioning Megaspore, Megaspore Haustoria, The Female Gametophyte, Types Of Embryo Sacs, Monosporic Types, Bisporic Embryo Sacs, Tetrasporic Embryo Sacs, Aberrant And Unclassified Types, Ultrastructure Of Embryo Sac, Synergids, Egg, Central Cell, Antipodals, Embryo Sac Haustoria, Nutrition Of Embryo Sac.	
2-3	FERTILIZATION:- Introduction, Pollen Stigma Interaction, Style, Entry Of Pollen Tube Into Embryo Sac, Pollen Tube Discharge, Mechanism Of Nuclear Fusion.	
2-4	SEXUAL INCOMPATIBILITY:- Introduction, Factors That Regulate Recombination In Plants, Self Incompatibility, Incompatibility Mechanisms, Establishment Of Inbleeding, Advantages And Biological Significance Of Self Incompatibility, Methods To Overcome Self Incompatibility.	
3-1	DEVELOPMENT OF ENDOSPERM:- Introduction, Development Of Endosperm, Nuclear Type, Cytology Of Endosperm, Aleurone Tissue, Functions Of Endosperm.	CR 03
3-2	DEVELOPMENT OF EMBRYO:- Introduction, Zygote, Embryogenesis In Dicots, Embryogenesis In Monocots- Grass, Suspensor.	
3-3	APOMIXIS:- Introduction, Classification, A Kind Of Vegetative Reproduction, Agamospermy, Embryo And Endosperm Development, Genetics Of Apomixes, Detection Of Apomixes, Significance Of Apomoxis.	
3-4	POLYEMBRYONY:- Introduction, Classification, True Polyembryony, False Polyembryony, Twins And Triplets, Induction Of Polyembryony, Causes Of Polyembryony, Applications Of Polyembryony.	
4-1	PARTHENOCARPY:- Introduction, GeneticalParthenocarp, Environmental Parthenocarp, Chemically Induced Parthenocarp, Methods Of Application, Use Of Synthetic Compounds To Induce Parthenocarp, Role Of Ovules In Parthenocarp, Imporatance Of Parthenocarp.	CR 04
4-2	EXPERIMENTAL EMBRYOLOGY:- Introduction, Infrastructure Requirments, Anther Culture, Ovary	

	And Ovule Culture.
4-3	APPLICATIONS OF EMBRYOLOGY IN TAXONOMY, AGRICULTURE AND HORTICULTURE:- Introduction, Applications Of Embryology In Solving Taxonomic Problems, Applications Of Embryology In Agricultural Practices, Applications Of Embryology In Horticultural Practices, Applied Aspects Of Pollen.
4-4	PRINCIPLES AND APPLICATIONS OF PALYNOLOGY:- Introduction, Pollen Development, Pollen Disposal, Chemical Composition Of Pollen And Spores, Pollen And Spore Morphology, Morphological Characters And Their Terminology, Palynology And Taxonomy, Exine Sculpturing, Aeropalynology, Geopalynology, Melittopalynology, Pollen And Spore Allergy, Medicinal Properties Of Pollen And Spores, Forensic Palynology.

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY022			
Text-Books			
BNY022-T01	Medicinal plants and embryology of angiosperms i. Prof. T.V.V.Seetarami Reddy ii. Prof. K.Lakshminarayana iii. Prof. V.S.Raju iv. Prof. K.C.Naidu v. Prof.R.R.Venkata Raju vi. Prof.Shyamala Ravi Shankar vii. Dr. B.K.Vijay Kumar	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY022 –RB1			
BNY022 –RB2			
BNY022 –RB3			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY022 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY022-WL1			

BNY023: APPLIED MYCOLOGY & PLANT PATHOLOGY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavhan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem.	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY023	Applied Mycology and Plant Pathology	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with Botany or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to know <ul style="list-style-type: none"> Mushroom cultivation Fungi as biopesticides

UNITS

UN	Name of the Unit	CSs	Questions
01-01 01-02 01-03 01-04 01-05 01-06	General Account And Diversity Of Fungi Fungal Taxonomy Mycorrhizae Edible Mushrooms: Medicinal And Nutritional Value Mushroom Cultivation Fungi As Biopesticides	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04 02-05	Scope And Techniques Of Fungal Biotechnology Fungal Enzymes And Metabolites Industrial Production Of Penicillin, Citric Acid And Alcohol Fungi In Relation To Pollution Fungi As Biodegradation	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04 03-05	History And Concepts Of Plant Pathology Classification And Symptomatology Of Fungal, Bacterial, Viral, Phytoplasmal And Nematode Diseases Host- Pathogen Interaction- I Host- Pathogen Interaction- II Control Of Plant Diseases	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-01 04-02 04-03 04-04	Plant Diseases Caused By Bacteria, Viruses, Phytoplasma And Spiroplasmas Plant Diseases Of Cereals, Pulses And Oil Seeds Plant Diseases Of Fruits And Vegetables Plant Diseases Of Cash Crops And Plantation Crops	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	GENERAL ACCOUNT AND DIVERSITY OF FUNGI:- Introduction, Importance Of Fungi, Thallus Organization In Fungi, HyphalSeptation, Cell And Cell Wall Structure, Fungal Tissues, Fungal Nutrition, Reproduction In Fungi, Life Cycles In Fungi, Systematic Position And Classification, Fungal Diversity, Fungi In Extreme Environments.	CR 01
1-2	FUNGAL TAXONOMY:- Introduction, Nomenclature, Criteria For Classifications, Types Of Classifications.	
1-3	MYCORRHIZAE:- Introduction, Types Of Mycorrhizae, Isolation And Multiplication Of Mycorrhizae. Role Of Mycorrhizae In Plant Growth, Applications Of Mycorrhizae.	
1-4	EDIBLE MUSHROOMS: MEDICINAL AND NUTRITIONAL VALUE:- Introduction, Edible Mushrooms, Medicinal Importance Of Mushrooms, Nutritional Value Of Mushrooms.	
1-5	MUSHROOM CULTIVATION:- Introduction, Cultivation Of <i>AgaricusBisporus</i> , Cultivation Of <i>Pleurotus</i> Spp., Cultivation Of <i>VolvariellaVovlaceae</i> .	
1-6	FUNGI AS BIOPESTICIDES:- Introduction, Fungi As Biocontrol Agents For Nematodes, Fungi As Biocontrol Agents For Insect Pests, Fungi As Biocontrol Agents For Weeds, Fungi As Biocontrol Agents For Diseases.	
2-1	SCOPE AND TECHNIQUES OF FUNGAL BIOTECHNOLOGY:- Introduction, Scope Of Fungal Biotechnology, Techniques Of Fungal Biotechnology.	CR 02
2-2	FUNGAL ENZYMES AND METABOLITES:- Introduction, Fungal Enzymes, Vitamins, Proteins From Fungi, Organic Acids, Amino Acids, Lipids, Alcohols.	
2-3	INDUSTRIAL PRODUCTION OF PENICILLIN, CITRIC ACID AND ALCOHO:- Introduction, Production Of Antibiotics, Production Of Organic Acids, Production Of Alcohol.	
2-4	FUNGI IN RELATION TO POLLUTION:- Fungi As Pollution Indicators, Role Of Fungi In Detoxification, Bioremediation Of Waste Water And Sewage Treatment.	
2-5	FUNGI IN BIODEGRADATION:- Introduction, Biodegradation Of Xenobiotics, Biodegradation Of Oil Spills (Hydrocarbons), Litter Decomposition.	
3-1	HISTORY AND CONCEPTS OF PLANT PATHOLOGY:- Introduction, Concept, Classification Of Plant Disease, History.	CR 03
3-2	CLASSIFICATION AND SYMPTOMATOLOGY OF FUNGAL, BACTERIAL, VIRAL, PHYTOPLASMA AND NEMATODE DISEASES:- Introduction, Classification Of Plant Diseases, Symptoms Of Fungal Plant Diseases, Symptoms Of Bacterial Plant Diseases, Symptoms Of Viral Plant Diseases, Symptoms Of Phytoplasmal Diseases, Symptoms Of Nematode Diseases.	
3-3	HOST- PATHOGEN INTERACTION-I :- Introduction, Adhesion, Entry, Establishment, Barriers (Physical) Elicitors, Signal Molecules And Signal Transduction, Symptom Production.	
3-4	HOST- PATHOGEN INTERACTION-II :- Introduction, Recognition, Barriers (Chemical), Diseases Syndrome, Physiological Changes Due To Infection.	
3-5	CONTROL PLANT DISEASES:- Introduction, Phytosanitation, Cultural Methods, Chemical Control, Disease Resistance, Biological Control.	
4-1	PLANT DISEASES CAUSED BY BACTERIA, VIRUSES AND SPIROPLASMAS:- Introduction, Bacterial Diseases, Viral Diseases, Plant Diseases Caused By Spiroplasma (Mycoplasma).	CR 04
4-2	PLANT DISEASES OF CEREALS, PULSES AND OIL SEEDS:- Diseases Of Cereals, Diseases Of Pulses, Diseases Of Oil Seeds.	
4-3	PLANT DISEASES OF FRUITS AND VEGETABLES:- Introduction, Plant Diseases Of Fruits, Plant Diseases Of Vegetables.	
4-4	PLANT DISEASES OF CASH CROPS AND PLANTATION CROPS:- Introduction, Plant Diseases Of Cash Crops, Plant Diseases Of Plantation Crops.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY023			
Text-Books			
BNY023-T01	Applied mycology and plant pathology i. Prof.B.P.R.Vittal ii. Prof. S.Ram Reddy iii. Prof. K.V.B.R.Tilak iv. Prof. B.Bhadraiah v. Prof.A.Janaki Bai vi. Prof.Rana Kauser vii. Prof. M.Madhusudan Rao viii. Prof. K.Satya Prasad	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY023 –RB1			
BNY023 –RB2			
BNY023 –RB3			
BNY023 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY023 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY023-WL1			

BNY024: PLANT MOLECULAR BIOLOGY & BIOTECHNOLOGY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY024	Plant Molecular Biology and Biotechnology	4	8	120	20	80	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B. Sc. with botany or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to know</p> <ul style="list-style-type: none"> Molecular markers Cryopreservation of plant cells and tissues and germplasm storage Protoplast culture and somatic hybridization

UNITS

UN	Name of the Unit	CR	Questions
01-01 01-02 01-03 01-04 01-05 01-06	Genome Genome organization in higher plants Chloroplast and mitochondrial genomes Structure and organization of eukaryotic genes Gene expressions in eukaryotes Regulation of gene expression in eukaryotes	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-01 02-02 02-03 02-04 02-05 02-06	Restriction endonucleases Modifying enzymes used in molecular cloning Cloning vectors Genomic and cDNA libraries Polymerase chain reaction Molecular markers	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
03-01 03-02 03-03 03-04	Introduction to plant tissue culture and <i>in vitro</i> morphogenesis Anther, pollen and ovule culture Cryopreservation of plant cells and tissues and germplasm storage Protoplast culture and somatic hybridization	CR 03	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
04-01 04-02 04-03 04-04	Transgenic plants Plant genomics and proteomics Plants metabolomics Intellectual property rights and biosafety	CR 04	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	GENOME:- introduction, concepts of genome organization, chromosome structure and organization, genome and gene organization, C-value paradox, kinetics of DNA reassociation, other important aspects of genome.	CR 01
1-2	GENOME ORGANIZATION IN HIGHER PLANTS:- definition and scope, techniques to study genome, genome organization, genome size and ploidy status, genome packaging, DNA kinetics, non-repetitive DNA, application of genome study.	
1-3	CHLOROPLAST AND MITOCHONDRIAL GENOMES:- introduction, genome organization of chloroplast, tobacco chloroplast genome organization, gene content, classification of plastids genomes, evolutionary changes, genome sequencing, applications, mitochondrial genome, genome organization of mitochondria, genome rearrangement, genome size, genetic map of the wheat mitochondrial genome, gene content, mitochondrial plasmid, cytoplasmic male sterility, evolutionary Mosaic.	
1-4	STRUCTURE AND ORGANIZATION OF EUKARYOTIC GENES:- introduction, organization of eukaryotic chromosome, eukaryotic gene structure, organization of eukaryotic genes.	
1-5	GENE EXPRESSION IN EUKARYOTES:- introduction, the central dogma of molecular biology, eukaryotic transcription, eukaryotic translation.	
1-6	REGULATION OF GENE EXPRESSION IN EUKARYOTES:- introduction, types of regulation of gene expression in eukaryotes.	
2-1	RESTRICTION ENDONUCLEASES:- introduction, types of restriction endonucleases, nomenclature of restriction endonucleases, recognition site, type-II restriction endonucleases, applications.	CR 02
2-2	MODIFYING ENZYMES USED IN MOLECULAR CLONING:- introduction, ligases, kinases and phosphates, polymerases, terminal transferase, nucleases, methylases, RecAprotein and AgarACE(..) Enzyme.	
2-3	CLONING VECTORS:- introduction (vectors and gene cloning vectors), plasmids, cosmid vectors, bacteriophage vectors (M 13 and (phage vectors), yeast artificial chromosomes (YAC vectors), bacterial artificial chromosomes (BAC Vectors).	
2-4	GENOMIC AND cDNA LIBRARIES:- introduction, construction and screening of genomic and cDNA libraries, colony hybridization for screening of libraries, cloning, cDNA libraries, applications of cDNA libraries, construction of DNA libraries with different vectors, genomic library vscDNAlibrary.	
2-5	POLYMERASE CHAIN REACTION:- introduction, principle, procedure, stages of PCR, applications of PCR, PCR variants.	
2-6	MOLECULAR MARKERS:- introduction, types of markers, properties of ideal DNA markers, applications of molecular markers, development of molecular markers in crop improvement programmes in India.	
3-1	INTRODUCTION TO PLANT TISSUE CULTURE AND <i>IN VITRO</i> MORPHOGENESIS:- introduction, totipotency and its expression <i>in vitro</i> , factors affecting <i>in vitro</i> morphogenesis, application of totipotency, production of synthetic seeds and their applications, limitations of synthetic seeds, stages of micropropagation, importance of micropropagation, limitations of micropropagation, future perspectives.	CR 03
3-2	ANTHER, POLLEN AND OVULE CULTURE:- introduction, induction of haploids, procedure of anther, pollen and ovule culture, merits and demerits of anther, pollen and ovule culture, factors affecting <i>in vitro</i> androgenesis, factors affecting <i>in vitro</i> gynogenesis, identification of haploids, diploidization to raise homozygous diploids, application of anther, pollen and ovule culture in crop improvement, limitations in exploiting anther, pollen and ovule culture in crop improvement, future perspectives.	
3-3	CRYOPRESERVATION OF PLANT CELLS AND TISSUES AND GERMPLASM STORAGE:- introduction, methods of <i>in vitro</i> conservation, cryopreservation facilities in India, future perspectives.	
3-4	PROTOPLAST CULTURE AND SOMATIC HYBRIDIZATION:- introduction, isolation of protoplasts,	

	culture of protoplasts, fusion of protoplasts (somatic hybridization).	
4-1	TRANSGENIC PLANTS:- introduction, genetic engineering techniques, achievements and advantages of transgenic plants, risks and controversies of transgenic plants.	CR 04
4-2	PLANT GENOMICS AND PROTEOMICS:- introduction, genomics research, proteomics research, practical applications of genomics and proteomics.	
4-3	PLANT METABOLOMICS:- introduction, metabolomics, the metabolome, metabolites, secondary metabolites, analytical technologies for analysis of secondary metabolites, metabolomics and system biology, metabolomics and bioinformatics tools.	
4-4	INTELLECTUAL PROPERTY RIGHTS AND BIOSAFETY:- introduction, history of intellectual property rights, branches of intellectual property, intellectual property organizations,intellectual property rights and convention of biological diversity, biosafety, history of biosafety, fields of biosafety application, Indian institute that deal with biosafety, biosafety norms.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY024			
Text-Books			
BNY024-T01	Plant molecular biology and biotechnology i. Prof.B.Pratibha Devi ii. Prof. A. Sadanandam iii. Prof. Prabha Nallari iv. Prof. Sudhakar v. Dr.G.Padmaja vi. Dr. S.Karnakar Reddy vii. Dr.Parveen Jahan viii. Dr. T.Srivalli ix. Dr. M.Srikanth Reddy x. Mrs. T.Leela	2009	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY024-RB1			
BNY024 -RB2			
BNY024 -RB3			
BNY024 -RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY024 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY024-WL1			

BNY025: LABORATORY MANUAL: CELL BIOLOGY, GENETICS, BIostatISTICS & ECOLOGY (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY025	Cell biology, genetics, biostatistics and ecology	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with botany or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to study <ul style="list-style-type: none"> Karyotype Analysis Evaluation of life form classes of local flora

UNITS

UN	Name of the Unit	CSs	Questions
01-01	Observation of cell and cell organelles	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-02	Squash preparation of Onion root Tips to study mitosis		
01-03	Smear preparation of Maize or onion flower Buds to study		
01-04	Meiosis		
01-05	Karyotype Analysis		
01-06	Problems of Monohybrid Cross		
01-07	Problems of Dihybrid Cross		
01-08	Problems of Trihybrid Cross Genetic Mapping in Eukaryotes		

02-01	Designing of Experiments and Random Sampling		
02-02	Problems on Means and Variations		
02-03	Problems on F-Ratio and Critical Differences(CD)		
02-04	Problems on Chi- Square Test		
02-05	Problems on ANOVA		
02-06	Determination of Minimum size Quadrats by species Area curve		
02-07	Determination of quantitative characters by random quadrat methods	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-08	Evaluation of life form classes of local flora		
02-09	Morphology and anatomy of common hydrophytes and xerophytes		
02-10	Interpretation of environmental data and climatogram and plotting techniques		
02-11	Mechanical analysis of soil, soil Ph, Soil moisture and water holding capacity.		
02-12	Estimation of chlorides, carbonates, Bicarbonates and dissolved oxygen in Clean and polluted water, BOD, COD		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	Observation of cell and cell organelles -to study the cell and its organelles(as observed under Electron microscope with the aid of photographs)	CR 01
1-2	Squash preparation of Onion root Tips to study mitosis - To observe different mitotic stages in the root tips of <i>Allium cepa</i> L. (2n=16)	
1-3	Smear preparation of Maize or onion flower Buds to study Meiosis - to observe different meiotic stages in pollen mother cells of onion flower buds.	
1-4	Karyotype Analysis -to observe chromosome morphology in the karyotype of onion and construct an Idiogram.	
1-5	Problems of Monohybrid Cross –To apply the knowledge of single gene inheritance to solve practical problems.	
1-6	Problems of Dihybrid Cross - To apply the knowledge of double gene inheritance to solve practical problems.	
1-7	Problems of Trihybrid Cross - To apply the knowledge of three gene inheritance to solve practical problems.	
1-8	Genetic Mapping in Eukaryotes - To construct genetic maps using trihybrid test cross method.	
2-1	Designing of Experiments and Random Sampling -To draw random sampling using Random Number Table.	CR 02
2-2	Problems on Means and Variations - to calculate the mean, variance, and standard deviation.	
2-3	Problems on F-Ratio and Critical Differences(CD) - to decide whether variances of two data are equal or not by mean of “F”- test, and also to decide whether the mean values representing two data are equal or not by means of “t”- test	
2-4	Problems on Chi- Square Test - To enable the significance of differences between observed and expected frequencies.	
2-5	Problems on ANOVA -To partition the total variance into different constituent factors and also into two constituent factors	
2-6	Determination of Minimum size Quadrats by species Area curve - To determine the minimum size of the quadrat by species area curved method.	
2-7	Determination of quantitative characters by random quadrat methods -- To determine the quantitative characters viz. frequency, density and abundance by random quadrat . to determine the basal cover of particular plant species, to determine the important value index, to determine the relative cover of the species by random quadrat method, to determine the similarity and dissimilarity index by random quadrat method.	
2-8	Evaluation of life form classes of local flora - To prepare frequency diagram of plant community by Raunkiaer method and preparation of biological spectrum.	
2-9	Morphology and anatomy of common hydrophytes and xerophytes - To identify the given specimen as a hydrophytes or xerophyte basing on its morphological and anatomical characters.	
2-10	Interpretation of environmental data and climatogram and plotting techniques - In this unit you will study about various methods followed to study the vegetation of a given area.	
2-11	Mechanical analysis of soil, soil Ph, Soil moisture and water holding capacity - To study the soil texture, Ph, soil moisture content and its water holding capacity.	
2-12	Estimation of chlorides, carbonates, Bicarbonates and dissolved oxygen in Clean and polluted water, BOD, COD -In this unit you will study about the estimation of quantities of chlorides, carbonates, bicarbonates, dissolved oxygen ,BOD,COD in clean and polluted water.	

LEARNING RESOURCE DETAILS

LR Code	Title	Edition	ISBN
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	Author	Year	Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY025			
Text-Books			
BNY025-T01	laboratory manual and Record Cell biology, genetics, biostatistics and ecology i. Prof.M.V.B.Subba Rao ii. Prof. B. Venkateshwar Rao iii. Prof.M.V.B.Subba Rao iv. Prof. V.Rattan Kumar v. Prof. M. Singara Charya vi. Prof. Mary Esther Cynthia	2011	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY025 –RB1			
BNY025 –RB2			
BNY025 –RB3			
BNY025 –RB4			
BNY025 –RB5			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY025 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY025-WL1			

BNY026: MEDICINAL PLANTS & EMBRYOLOGY OF ANGIOSPERMS (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ and http://ycmou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY026	Medicinal plants and embryology of angiosperms	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
<p>For successful completion of this course, student should have successfully complete:</p> <ul style="list-style-type: none"> B.Sc. with botany or equivalent from a recognized University/Board. 	<p>After successful completion of this course, student should be able to know</p> <ul style="list-style-type: none"> Collection of ethno botanical information of Local Medicinal Plants. Study of endosperm Haustoria Study of embryos Anther culture Callus culture.

UNITS

UN	Name of the Unit	CSs	Questions
01-01	Analysis of morphological attributes in Selected Medicinal plants.	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-02	Identification of crude drugs using anatomical characters.		
01-03	Identification of crude drugs using physical properties.		
01-04	Qualitative analysis of crude drugs for different Phytochemicals.		
01-05	Antimicrobial studies and determination of MIC (Minimum Inheritance Concentration.)		
01-06	Anatomical studies of medicinal plants.		
01-07	Histochemical analysis of medicinal plants.		
01-08	Collection of ethno botanical information of Local Medicinal Plants.		

02-01	Study of ovules and ovaries and their identification.	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-02	Pollen grain analysis by acetolysis.		
02-03	Pollen germination studies		
02-04	Estimation of pollen fertility		
02-05	Study of endosperm Haustoria		
02-06	Study of embryos		
02-07	Study of protandry and protogyny		
02-08	Study of heterostyly.		
02-09	Fundamentals of microtome technique		
02-10	Preparation of permanent slides.		
02-11	Anther culture		
02-12	Callus culture.		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	Analysis of morphological attributes in Selected Medicinal plants. -In this unit you will study the morphological and organoleptic characters of few crude drugs.	CR 01
1-2	Identification of crude drugs using anatomical characters- In this unit you will study the identification of crude drugs using microscopic anatomical characters	
1-3	Identification of crude drugs using physical properties- In this unit you will study the physical properties for the identification of crude drugs.	
1-4	Qualitative analysis of crude drugs for different Phytochemicals-- In this unit you will study the chemical composition of crude drugs through qualitative phytochemical analysis.	
1-5	Antimicrobial studies and determination of MIC (Minimum Inheritance Concentration.) -In this unit you will study the experimental design to estimate the inhibitory property of crude drug samples on the pathogenic microorganisms. This experimental also helps you to determine the MIC of the test sample against the pathological strains. The main aim of the present topic is “to determine the antimicrobial activity of selected crude drug or medicinal plant by using disc diffusion method.”	
1-6	Anatomical studies of medicinal plants- In this unit you will study the Anatomical studies of some medicinal plants to understand the anatomical diversity in the structure and composition of various tissues in plant parts like stem, root, leaf etc.	
1-7	Histochemical analysis of medicinal plants- to study, test and identify the different chemical constituents of the types of wall thickenings and non- living inclusion of plant cells, through histochemical analysis.	
1-8	Collection of ethno botanical information of Local Medicinal Plants- In this unit you will know how to get ethnobotanical information about the medicinal plants from the people belonging to primitive societies.	
2-1	Study of ovules and ovaries and their identification.- In this unit you will study the structure of the typical ovule, types of ovules and their associated structures; different types of ovaries and the features of their identification.	CR 02
2-2	Pollen grain analysis by acetolysis-- In this unit you will know the method of the preparation of pollen grains by acetolysis.	
2-3	Pollen germination studies- In this unit you will study the germination of pollen grains invitro.	
2-4	Estimation of pollen fertility- In this unit you will study the estimation of pollen fertility/ viability by Tetrazolium test.	
2-5	Study of endosperm Haustoria- In this unit you will study the morphology of endosperm haustoria in a few species by dissecting endosperm from seeds. You can also study the endosperm haustoria through permanent.	

2-6	Study of embryos- In this unit you will study major stages of embryo formation in a couple of species through dissection and also through permanent slides.	
2-7	Study of protandry and protogyny- In this unit you will learn about the floral characters and maturity of sex organs at different times.	
2-8	Study of heterostyly- In this unit you will study the morphology of flower and pollination mechanisms in preventing self – pollination.	
2-9	Fundamentals of microtome technique-- In this unit you will be learning to prepare material for studying embryological development in a species using microtome.	
2-10	Preparation of permanent slides- In this unit you will be learning to take section using a microtome, prepare slides, make them permanent after staining.	
2-11	Anther culture- In this unit you will study the methods of anther culture to produce haploids and homozygous diploids under suitable conditions. Then you can practice the same to produce haploids.	
2-12	Callus culture- In this unit you will be learn about how to culture the callus tissue on nutrient medium.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY026			
Text-Books			
BNY026-T01	laboratory manual and Record Medicinal plants and embryology of angiosperms i. Prof. K.Lakshminarayana ii. Prof. K.C.Naidu iii. Prof.Shyamala Ravi Shankar iv. Prof.R.R.Venkata Raju v. Prof.Y.N.R.Varma vi. Dr. B.K.Vijay Kumar vii. Dr.A.Vijaya Bhasker Reddy	2011	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY026–RB1			
BNY026 –RB2			
BNY026 –RB3			
BNY026 –RB4			
BNY026 –RB5			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY026 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY026-WL1			

1957

BNY027: APPLIED MYCOLOGY & PLANT PATHOLOGY (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY027	Applied mycology and plant pathology	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with botany or equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to know <ul style="list-style-type: none"> Fermentation Methods Testing of some isolates of <i>Penicillium</i> species against pathogenic bacteria

UNITS

UN	Name of the Unit	CSs	Questions
01-01	Sterilization Methods, Preparation of Media and Stains	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-02	Isolation techniques		
01-03	Single Spore Isolation, Pure Culture and Conservation of Fungal Germplasm		
01-04	Fermentation Methods		
01-05	Isolation of <i>Trichoderma viride</i> and <i>T.harzianum</i> and their evaluation as Biocontrol Agents		
01-06	Collection and identification of Ectomycorrhizae		
01-07	VAM Fungal Root Colonization, Evaluation and Quantification in <i>Parthenium</i> and <i>Castor</i>		
01-08	Isolation of Keratinophilic fungi		
01-09	Observation of Hyperparasites and Common Entomogenous Fungi		
01-10	Testing of some isolates of <i>Penicillium</i> species against pathogenic bacteria		

02-01	Observation of Plant Disease Symptoms Caused by Bacteria, Viruses and Fungi	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-02	Observation of Fungal Pathogens and their identification		
02-03	Isolation of plant pathogens and pure culture preparation		
02-04	Establishing Koch's postulates for evaluation of pathogenecity		
02-05	Evaluation of disease index and crop loss		
02-06	Evaluation of culture filtrates for cellulose, pectinase, protease and amylase		
02-07	Estimation of protein and amino acids		
02-08	Spawn preparation of edible mushrooms(Oyster), bed		
02-09	preparation and mushroom production		
02-10	Evaluation of fungicidal efficacy		
02-11	Collection of materials with diseases		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	Sterilization Methods, Preparation of Media and Stains - In this unit you will study the different methods of sterilization, preparation of different media and stains.	CR 01
1-2	Isolation techniques - In this unit you will determine the number of fungi present in a given sample of soil, air, as well as on leaf.	
1-3	Single Spore Isolation, Pure Culture and Conservation of Fungal Germplasm -In this unit you will try to isolate single spores, bring them into pure culture and learn different methods of conservation of fungal cultures.	
1-4	Fermentation Methods -In this unit you will determine total acidity,volatile acidity and oer cent alcohol of the fermenting juice.	
1-5	Isolation of <i>Trichoderma viride</i> and <i>T.harzianum</i> and their evaluation as Biocontrol Agents -In this unit you will learn the technique for isolation of <i>Trichoderma viride</i> and <i>Trichoderma harzianum</i> from rhizosphere soil and phylloplane and study their in vitro and in vivo evaluation of biocontrol ability against <i>Fusarium</i> sp. and <i>Colletotrichum</i> sp.	
1-6	Collection and identification of Ectomycorrhizae -In this unit,you will study the method of collection and identification of Ectomycorrhizae	
1-7	VAM Fungal Root Colonization,Evaluation and Quantification in <i>Parthenium</i> and <i>Castor</i> -In this unit you will study the habit and the identification characters of AM fungi.	
1-8	Isolation of Keratinophilic fungi -In this unit you will learn the methods of isolation of keratinophilic fungi and examine some common dermatophytes	
01-09	Observation of Hyperparasites and Common Entomogenous Fungi -To identify hyperparasites and entomogenous fungi given samples.	
01-10	Testing of some isolates of <i>Penicillium</i> species against pathogenic bacteria -In this unit you will study how to test some of the isolates of <i>Penicillium</i> spp. against pathogenic bacteria	
2-1	Observation of plant disease symptoms caused by bacteria, viruses and fungi - in this unit, you will make observation on plant disease symptoms caused by bacteria, viruses and fungi	CR 02
2-2	Observation of Fungal Pathogens and their identification -To study the anatomical features of leaves infected by fungi	
2-3	Isolation of plant pathogens and pure culture preparation -To isolate and identify the fungal pathogen of a plant disease and prepare pure culture of the pathogen	
2-4	Establishing Koch's postulates for evaluation of pathogenicity -To evaluate the pathogenic nature of fungus	
2-5	Evaluation of disease index and crop loss -To assess the disease severity index in the given material	
2-6	Evaluation of culture filtrates for cellulose, pectinase, protease and amylase -To measure the activity of cellobiohydrolase (C) , Pectin lyase ,by ace,protease, amylase, endoglucanase of given fungal culture filtrate.	
2-7	Estimation of protein and amino acids –To estimate the proteins and amino acids in the given fungal culture filtrate	
2-8	Spawn preparation of edible mushrooms(Oyster), bed preparation and mushroom production - In this unit will study the preparation of spawn substrate,bed and production of Oyster mushrooms	
2-9	Evaluation of fungicidal efficacy -In this unit you will study the evaluation of fungicidal efficacy of fungicides viz.,Dithane Z-78,Bavistin,Vitavax using spore germination and poisoned food techniques.	
2-10	Collection of materials with diseases -To know the procedure or methods to collect and preserve the diseased plant material.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY027			
Text-Books			
BNY027-T01	laboratory manual and Record Applied mycology and plant pathology i. Prof.B.P.R.Vittal ii. Prof. B.Bhadraiah iii. Prof.A.Janaki Bai iv. Prof.Rana Kauser v. Prof. K.V.B.R.Tilak vi. Prof. K.Satya Prasad vii. Prof. M.Madhusudan Rao	2011	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY027-RB1			
BNY027 -RB2			
BNY027 -RB3			
BNY027 -RB4			
BNY027-RB5			
BNY027 -RB6			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY027 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY027-WL1			

BNY028: PLANT MOLECULAR BIOLOGY & BIOTECHNOLOGY (PRACTICAL)

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ymou.ac.in/ and http://ymou.digitaluniversity.ac/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG
5	Course Used in	V134: M.Sc.(BOTANY)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	BNY028	Plant molecular biology and biotechnology	2	8	120	10	40	50	P

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully complete: <ul style="list-style-type: none"> B.Sc. with BOTANY equivalent from a recognized University/Board. 	After successful completion of this course, student should be able to know <ul style="list-style-type: none"> RAPD Analysis Gene cloning- Exploring Gene bank Database and Blast Search

UNITS

UN	Name of the Unit	CSs	Questions
01-01	Isolation of plasmid DNA from bacteria and agarose gel electrophoresis of DNA	CR 01	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
01-02	Production of competent cells and bacterial transformation		
01-03	Isolation of plant genomic DNA		
01-04	Restriction endonuclease digestion of plasmid and genomic DNA		
01-05	Isolation of plant RNA		
01-06	Quantification of DNA, RNA and reassociation kinetics of DNA		
01-07	Polymerase chain reaction		
01-08	Southern, Northern and Western Blotting-		
01-09	RAPD Analysis		
01-10	Gene cloning-		

02-01	Preparation of media, surface sterilization and inoculation of explants	CR 02	Student is required to answer 4 of 5 SAQ, each of 5 marks, on each CR
02-02			
02-03	Initiation of callus and suspension cultures		
02-04	Plant regeneration from callus cultures-		
02-05	Micropropagation of plants		
02-06	Protoplast isolation and culture		
02-07	Genetic transformation of plants using <i>Agrobacterium tumefaciens</i>		
02-08	Induction of hairy root cultures using <i>Agrobacterium rhizogenes</i>		
02-09	Direct gene transformation of plants using biolistic gun—		
	Sequence alignment		
	Exploring Genebank Database and Blast Search		

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CR
1-1	Isolation of plasmid DNA from bacteria and agarose gel electrophoresis of DNA -In this unit you will study the method of isolation of plasmid DNA from bacteria and agarose gel electrophoresis of DNA	CR 01
1-2	Production of competent cells and bacterial transformation - In this unit you will study the method of preparation of competent cells <i>E.coli</i> and also transformed with plasmid DNA	
1-3	Isolation of plant genomic DNA -In this unit you will study the method of isolation of genomic DNA from plant material	
1-4	Restriction endonuclease digestion of plasmid and genomic DNA -In this unit you will study the method of digestion DNA by using restriction endonuclease to takeout the DNA of interest	
1-5	Isolation of plant RNA -In this unit you will study the method of isolation of RNA from plant material	
1-6	Quantification of DNA, RNA and reassociation kinetics of DNA --In this unit you will study the method to estimate the amount of DNA by diphenylamine reaction estimate the amount of RNA by original method of study the reassociation kinetics of DNA .	
1-7	Polymerase chain reaction -In this unit you will study the polymerase chain reaction .You will also learn how to set-up a PCR and amplify a sequence of a given gene in the laboratory.	
1-8	Southern, Northern and Western Blotting -In this unit you will study the molecular methods of blotting i.e Southern, Northern and Western blotting.	
01-09	RAPD Analysis -In this unit you will study the method of RAPD Analysis of plants by using the PCR method and employing random primers.	
01-10	Gene cloning --In this unit you will study the method to insert gene of interest in a cloning vector to be used in genetic transformation experiments.	
2-1	Preparation of media, surface sterilization and inoculation of explants -In this unit, you will learn to prepare plant tissue culture medium and inoculate the surface sterilized explants into the medium.	CR 02
2-2	Initiation of callus and suspension cultures -In this unit, you will learn the procedure for inducing callus from tap root of carrot (<i>Daucuscarota</i> L.) and suspension cultures from the callus.	
2-3	Plant regeneration from callus cultures -In this unit learn the procedure of regenerating plants from callus cultures induced from leaf explants of tobacco.	
2-4	Micropropagation of plants -In this unit you will study the method of culture and regeneration of plants on defined culture media in the laboratory.	
2-5	Protoplast isolation and culture -In this unit you will study the method of isolation of protoplast using the enzymatic method and their culture.	
2-6	Genetic transformation of plants using <i>Agrobacterium tumefaciens</i> - In this unit you will study the method of culture of the soil bacterium <i>Agrobacterium tumefaciens</i> and the development of genetically transformed shoots after infecting plants with the bacterium.	
2-7	Induction of hairy root cultures using <i>Agrobacterium rhizogenes</i> -In this unit you will study the method of culture of the soil bacterium <i>Agrobacterium rhizogenes</i> and the induction of hairy roots by infecting plants with the bacterium.	
2-8	Direct gene transformation of plants using biolistic gun -- In this unit you will study the method of using the biolistic gun to directly transfer foreign genes into plants and analyse the bombarded explants by histochemical GUS assay.	
2-9	Sequence alignment -In this unit you will study the bioinformatics method of sequence alignment by working on a computer online.	
2-10	Exploring Genebank Database and Blast Search -In this unit you will study the bioinformatics method of exploring the Genebank Database and Blast Search for homologues in sequence databases by working on a computer online.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Mobile and Online Lectures, (2) Discussion Forum for online interaction and (3) Self-Test for each CR Block, Continuous Assessment Test and End Examination			
CW-BNY028			
Text-Books			
BNY028-T01	laboratory manual and Record Plant molecular biology and biotechnology i. Prof.B.Pratibha Devi ii. Prof. N.Ramaswamy iii. Dr.G.Padmaja iv. Dr.Parveen Jahan v. Dr. T.Srivalli	2012	BRAOU, Hyderabad
Reference-Books: Explore additional details and reinforce learning, with this optional learning resource!			
BNY028 –RB1			
BNY028 –RB2			
BNY028 –RB3			
BNY028 –RB4			
CD / DVD: Explore additional details and reinforce learning, with this optional learning resource!			
BNY028 -CD1			
Web Links: Explore additional details and reinforce learning, with this optional learning resource!			
BNY028-WL1			

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