



SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR
Faculty of Science
Under Graduate (UG) Programmes
SUBJECT: BOTANY

INTRODUCTION

The SRTMUN is gearing up for several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission; process was already initiated towards introduction of semester system, grading system and credit system. In the recent past, University had already implemented Credit based grading system to campus schools and Choice Based Credit System (CBCS) pattern for PG in all the affiliated colleges from the academic year **2014-2015**. These regulations shall be called as Choice Based Course Credit System & Grading, 2014. In short it will be referred as **SRTMUN CBCS REGULATION**.

Now University is going one step ahead to implement Choice Based Credit System (CBCS) pattern at UG level from the academic year **2016-2017** progressively for B.Sc. first year, second year and third year respectively. Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curriculum at UG and PG levels as per the **SRTMUN CBCS REGULATION**, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The B.Sc. Botany (General) semester pattern course is running in different affiliated colleges of the SRTMUN. The course content has been designed under CBCS pattern. The course content of each theory paper is divided into units by giving appropriate titles and subtitles. For each unit, total number of periods required, weight age of maximum marks and credits are mentioned. A list of practical exercises and skills for laboratory work to be completed in the academic year is also given. A list of selected reading material and a common skeleton question paper for all papers of semester-I, II, III, IV, V&VI are also provided at the end of the syllabus.



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OBJECTIVES

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.
2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.
3. To impart knowledge of plant science as the basic objective of Education
4. To develop a scientific attitude to make students open minded, critical and curious
5. To develop an ability to work on their own and to make them fit for the society
6. To expose themselves to the diversity amongst life forms
7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of plant materials and data
8. To make aware of natural resources and environment and the importance of conserving the same
9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient
10. To appreciate and apply ethical principles to plant science research and studies



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CLASS: B. Sc. FIRST YEAR

An Outline:

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-I	CCB-I	Section-A	Theory Paper-I: Diversity of Microbes	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-II: Cell and Molecular Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-II	CCB-II	Section-A	Theory Paper-III: Diversity of Cryptogams	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-IV: Genetics and Plant Breeding	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCBP-I		Practical Paper-V: Practicals based on theory papers of CCB-I&II	24 Prac. (03/week/ batch)	80	20	Credits: 04 (Marks:100)
Total					240	60	Credits: 12 (Marks:300)

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment

Distribution of marks: 80% of the total marks for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **CA of Marks-20:** 10 marks for Test/ Assignments & 10 marks for attendance



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CLASS: B. Sc. SECOND YEAR

An Outline:

Semester/ Annual	Course Name	Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)	
				External (ESE)	Internal (CA)		
Semester-III	CCB-III	Section-A	Theory Paper-VI: Morphology and Taxonomy of Angiosperms	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-VII: Histology, Anatomy and Embryology of Angiosperms	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-IV	CCB-IV	Section-A	Theory Paper-VIII: Gymnosperms and Palaeobotany	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-IX: Ecology and Environmental Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCBP-II	Section-A	Practical Paper-X: Practicals based on theory papers-VI & VIII	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	SEC-I: (1 Skill/Optional)	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Annual pattern	CCBP-III	Section-A	Practical Paper-XI: Practicals based on theory papers-VII & IX	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	SEC-II: (1 Skill/Optional)	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Total Credits Semester-III and IV					240	60 (100*)	Credits: 12 (04*) (Marks:300) (marks:100*)

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment, **SEC:** Skill Enhancement Course, *****: Credits/three options

Distribution of credits: 80% of the total credits for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **SEC of Marks 50*:** 15marks /1skill/optional & 05 marks for attendance/three options i.e. 50/3= 15 +5 (for attendance/ three options)



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CLASS: B. Sc. THIRD YEAR

An Outline:

Semester/ Annual	Course Name	Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
				External (ESE)	Internal (CA)	
Semester-V	DSEB-V	Section-A Theory Paper-XII: Plant Physiology	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B Theory Paper-XIII: Plant Pathology-I OR Theory Paper-XIII: Systematic Botany-I OR Theory Paper-XIII: Applied Economic Botany-I OR Theory Paper-XIII: Herbal Technology-I	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-VI	DSEB-VI	Section-A Theory Paper-XIV: Plant Metabolism, Biochemistry and Biotechnology	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B Theory Paper-XV: Plant Pathology-II OR Theory Paper-XV: Systematic Botany-II OR Theory Paper-XV: Applied Economic Botany-II OR Theory Paper-XV: Herbal Technology-II	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	DSEBP-I	Section-A Practical Paper-XVI: Practicals based on theory papers-XII&XIV	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B SEC-III: (1 Skill/Optional)	01 Skill (03/week/ batch)	--	50*	Credits: 02* (Marks:50)



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Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Annual pattern	DSEBP-II	Section-A	Practical Paper-XVII: Practicals based on theory papers-XIII&XV	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	SEC-IV: (Project)	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Total Credits Semester-V and VI					240	60 (100*)	Credits: 12 (Marks:300) Credits: (04*) (Marks:100*)

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment, **SEC:** Skill Enhancement Course, **DSEB:** Discipline Specific Elective Botany, **DSEBP:** Discipline Specific Elective Botany Practical, * : Credits/three options

Distribution of credits: 80% of the total credits for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **SEC –III of Marks 50*:** 15marks /1skill/optional & 05 marks for attendance/three options i.e. 50/3= 15 +5 (for attendance/ three options)
- **SEC –IV (Project) of Marks 50*:** 50 marks /project/optional



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CLASS: B. Sc. FIRST YEAR, SEMESTER-I
CORE COURSE BOTANY (CCB)-I
SECTION-A
(THEORY PAPER-I: DIVERSITY OF MICROBES)

Periods: 45

Credits: 02 (Maximum Marks: 50)

UNIT – I: VIRUSES AND MYCOPLASMA (10 periods)

Viruses: General characters, Classification based on host, Structure of plant viruses (TMV), Transmission of viruses, Economic importance of viruses, Yellow vein mosaic of Bhendi and Bean mosaic; **Mycoplasma:** General characters, Systematic position and Structure, Little leaf of Brinjal; **Prions:** General characters.

UNIT – II: BACTERIA (13 periods)

Bacteria: General characters, Ultra structure of bacterial cell, Mode of nutrition, asexual reproduction (By binary fission), Sexual reproduction (By conjugation); **Cyanobacteria:** Salient features of cyanobacteria, Systematic position, habitat, distribution, structure and reproduction in *Nostoc*; **Archaeobacteria:** Habit and Forms; Economic importance of bacteria in industries, medicines and agriculture.

UNIT – III: FUNGI (10 periods)

General characters fungi Classification of fungi (as per Alexopoulos and Mims, 1979), **Type study:** Systematic position, occurrence, structure of mycelium, reproduction and graphic life cycle of *Albugo* and *Eurotium*

UNIT – IV: FUNGI AND LICHENS (12 periods)

Fungi: Systematic position, occurrence, structure of mycelium, reproduction and graphic life cycle of *Puccinia* and *Alternaria*, Economic Importance of fungi in industries, medicines, food and agriculture; **Lichens:** General characters, Classification, Types and Economic importance.



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CLASS: B. Sc. FIRST YEAR, SEMESTER-I
CORE COURSE BOTANY (CCB)-I
SECTION-B
(THEORY PAPER-II: CELL AND MOLECULAR BIOLOGY)

Periods: 45

Credits: 02 (Maximum Marks: 50)

UNIT-I: CELL BIOLOGY-I (10 periods)

Introduction to cell biology, Ultra structure of prokaryotic and eukaryotic cell, Ultra structure and function of Nucleus (Nuclear membrane and nucleolus), Ultra structure and function of Cell organelles: Golgi complex, Lysosome, Endoplasmic reticulum and Ribosome.

UNIT-II: CELL BIOLOGY-II (13 periods)

Chromosome: Morphology, structure, chemical composition, euchromatin, heterochromatin and function of typical chromosome, Study of Karyotype and ideogram of human being, Structure and significance of giant chromosomes- Polytene and Lampbrush chromosomes, **Cell division:** Cell cycle, Process and significance of Mitosis and Meiosis.

UNIT-III: MOLECULAR BIOLOGY-I (12 periods)

Nucleic acids: Introduction, chemical composition, **DNA:** Structure (Watson & Crick model), forms (A, B, Z) and Semi conservative replication (Meselson and Stahl experiment), **RNA:** Structure, function and types

UNIT-IV: MOLECULAR BIOLOGY-II (10 periods)

Gene concept: Classical (Morgan's view), Fine structure of gene (S. Benzer), Gene mutations (spontaneous and induced) and related diseases (transposable genetic elements, phenyl ketonuria, Alkaptonuria, Albinism, Sickle cell anemia and Amniocentesis (detection of genetic diseases).



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CLASS: B. Sc. FIRST YEAR, SEMESTER-II

CORE COURSE BOTANY (CCB)-II

SECTION-A

(THEORY PAPER-III: DIVERSITY OF CRYPTOGRAMS)

Periods: 45

Credits: 02 (Maximum Marks: 50)

UNIT – I: ALGAE –I (10 periods)

General characters of algae, Classification of algae (As per F.E.Fritsch, 1935), Systematic position, occurrence, thallus structure, reproduction and graphic life cycle with alternation of generation of *Oedogonium* and *Chara*

UNIT – II: ALGAE-II (10 periods)

Systematic position, occurrence, thallus structure, reproduction and graphic life cycle with alternation of generation of *Ectocarpus* and *Batrachospermum*, Economic importance of algae (Food and fodder)

UNIT – III: BRYOPHYTA (12 periods)

General characters of Bryophytes, Classification of Bryophytes (As per N.S.Parihar), Systematic position, occurrence, thallus structure (external and internal), reproduction and graphic life cycle with alternation of generation of *Riccia* and *Funaria* (Developmental stages not expected), Economic importance of Bryophytes

UNIT – IV: PTERIDOPHYTA (13 periods)

General characters of Pteridophytes, Classification of Pteridophytes (as per N.S.Parihar), Systematic position, occurrence, structure of sporophyte (external and internal), reproduction and graphic life cycle with alternation of generation of *Equisetum* and *Marsilea* (Developmental stages not expected)

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CORE COURSE BOTANY (CCB)-II

SECTION-B

(THEORY PAPER-IV: GENETICS AND PLANT BREEDING)

Periods: 45

Credits: 02 (Maximum Marks: 50)

UNIT –I: GENETICS-I (13 periods)

Genetic Inheritance- Mendelism, Mendel's Laws of inheritance- Explanation and examples of Monohybrid cross, Dihybrid cross, Back cross and Test cross, Gene interaction and epistasis- (Allelic and non allelic), explanation and examples of complementary gene action (9:7), supplementary gene action (9:3:4), epistatic gene action (12:3:1) and Duplicate gene action (15:1), Sex determination: Discovery of sex chromosomes, chromosomal theory of sex determination - in insects (XO-XX), Birds (ZW-ZZ method), Animals (Drosophila and Man), Plants (Melandrium).

UNIT –II: GENETICS-II (12 periods)

Sex linked inheritance- Definition, classification (x-linked, y-linked and xylinked), Sex linked inheritance in Drosophila (White eye colour) and Sex linked inheritance in Man (Hemophilia, Colour blindness) Holandric gene – hypertrochosis and Sex linked inheritance in Birds-Barred feathers. Chromosomal Aberrations (Numerical): Polyploidy (Haploids, diploids, Triploids, Tetraploids and polyploids) Euploidy- Autopolyploidy and Allopolyploidy with reference to Raphanobrassica and Hexaploid wheat , Aneuploidy (hyper and Hypoploidy), Human syndromes (Autosomal and sex - chromosomal syndromes)- Down's syndrome, Turner's Syndrome and Klinefelters syndrome.

UNIT –III: PLANT BREEDING (10 periods)

Introduction, objective of plant breeding, **Methods of plant breeding:** Selection-Mass selection, Pure line selection, Clonal selection, Hybridization- definition, objectives, various steps and application, Heterosis- Definition; effects, utilization and limitation

UNIT –IV: PLANT BREEDING (10 periods)

Plant Introduction and Acclimatization: introduction, types, advantages and disadvantages, **Mutational breeding:** objectives, procedure and application, methods of mutational breeding with reference to groundnut, Male sterility; Genetic male sterility, Cytoplasmic male sterility.



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CORE COURSE BOTANY PRACTICAL (CCBP)-I
(PRACTICAL PAPER-V: BASED ON THEORY PAPER-I, II, III&IV)

Practicals: 24

Credits: 04 (Maximum Marks: 100)

Practical Exercises:

1. Study of symptoms of Yellow vein mosaic of Bendi and Little leaf of Brinjal **(1 practical)**
2. Morphological study of Bacteria by Gram staining method **(1 practical)**
3. Study of systematic position and external features of *Nostoc* **(1 practical)**
4. Study of Fungi- Systematic position, external and internal features of *Albugo*, *Eurotium*, *Puccinia*, *Alternaria* **(2 practical)**
5. Study of Crustose, Foliose and Fructicose forms of lichens **(1 practical)**
6. Study of Algae-Systematic position and external features of *Oedogonium*, *Chara*, *Ectocarpus* and *Batrachospermum* **(3 practical)**
7. Study of Bryophytes- Systematic position, external and internal features of *Riccia* and *Funaria* **(2 practical)**
8. Study of Pteridophytes- Systematic position, external features of adult sporophyte and T.S. of stem of *Equisetum* and systematic position, external features of adult sporophyte and T.S. of stem and petiole of *Marsilea* **(2 practical)**
9. Study of cell organelles prescribed in theory using Charts/models/ slides/ photograph/ Photostat copy **(1 practical)**
10. Study of Polytene and Lampbrush chromosomes with the help of permanent slides/ photograph/ Photostat copy **(1 practical)**
11. Study of Cell division – Mitosis and meiosis **(5 practical)**
12. Problems based on Monohybrid and Dihybrid ratios, Interaction of Allelic gene- Complementary gene action (9:7) and supplementary gene action (9:3:4), Non-allelic gene (Epistasis) -Epistatic gene action (12:3:1), Duplicate gene action (15:1) and sex linked inheritance **(5 practical)**
13. Study of human syndromes (as mentioned in theory syllabus) by using photocopies **(1 practical)**
14. Botanical excursions (One short and one long) are compulsory **(4 practical)**

Note: Students should submit excursion report in detail in the practical examination for evaluation. The report shall carry marks



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CORE COURSE BOTANY PRACTICAL (CCBP)-I
(PRACTICAL PAPER-V: BASED ON THEORY PAPER-I, II, III&IV)**

END OF SEMESTER EXAMINATION (ESE)
Skeleton question paper

Time: Four hours

Maximum Marks: 80

- Note:** (i) Attempt all questions
(ii) Show your preparation to the examiner
(iii) Draw neat and well labelled diagrams wherever necessary
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- Q1.** Identify, classify and describe the given specimen-A (Fungi) on the basis of external and internal characters (The specimen-A may be given alternately to the students) **(12 marks)**
- Q2.** Identify, classify and describe any two algae from the given algal mixture on the basis of external characters **(12 marks)**
- Q3.** Identify, classify and describe the given specimen-B (Bryophytes /Pteridophytes) on the basis of external and internal characters (The specimen-C may be given alternately to the students) **(12 marks)**
- Q4.** Prepare a temporary squash / smear of the given material- C. Identify and describe any two stages of mitosis / meiosis giving reasons (The material-E for mitosis and meiosis may be given alternately to the students) **(14 marks)**
- Q5.** Solve a problem based on Dihybrid ratio / Interaction of Allelic gene / Interaction of Non-allelic gene/ Duplicate gene/ Sex linked inheritance (the problems may be given alternately to the students) **(08 marks)**
- Q6.** Identify and describe giving reasons (4 spots): Viruses / Mycoplasma / Bacteria/ Fungi/ Lichens-1, Bryophytes /Pteridophytes-1, Cell Biology-1, Syndrome-1 **(08 marks)**
- Q7.** (I) Record Book **(10 marks)**
(ii) Submission of Excursion report and Collection **(04 marks)**
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