



# Syllabus

## For B.Sc 5<sup>th</sup> Semester Courses in

### Botany

### (June 2020 onwards)

- Contents:
- Theory Syllabus for Courses:
  - SBOT0501 – Cytology and Biotechnology
  - SBOT0502 – Plant Systematics
  
- Practical Course Syllabus for: SBOT05PR
- Evaluation and Assessment guidelines.

**T.Y. B.Sc. Botany**

**Course code: SBOT0501**

**Course Title: CYTOGENETICS AND BIOTECHNOLOGY**

**Learning Objectives:**

1. To understand the mechanism of cell division, linkage and crossing over.
2. To learn various gene mutations, their adverse effects in man and advantages in plant breeding.
3. To comprehend the role of enzymes, vectors and methods in gene cloning.
4. To study the techniques in molecular biology and know its importance.

**Number of lectures: 60**

**Unit 1**

**(15 lectures)**

**Inheritance and Molecular Biology**

Cytoplasmic Inheritance- streptomycin sensitivity in *Chlamydomonas*, CO<sub>2</sub> sensitivity in *Drosophila* (sigma factor). Plastid inheritance - variegation in *Mirabilis jalapa*, male sterility in plants, petite colonies in yeast. DNA- central dogma of protein synthesis, transcription, genetic code, translation.

**Unit 2**

**(15 lectures)**

**Mutation**

Gene Mutations: types - somatic / germ line, spontaneous / induced, gross / point - base pair substitutions- transversion, transition; effect on phenotype - missense, nonsense, neutral, silent mutations. Chromosomal mutations: structural and numerical changes in chromosomes; role of mutations in plant breeding and crop improvement.

**Unit 3**

**(15 lectures)**

**Biotechnology I**

Nucleic acids modifying enzymes – ligase, restriction endonucleases, polymerases, kinases, phosphatases, reverse transcriptase. Vectors used in gene cloning – plasmids, phages, cosmids, YAC and BAC; Methods of gene transfer - physical, chemical and biological.

**Unit 4**

**(15 lectures)**

**Biotechnology II**

Methods of gene identification in organisms, gene libraries, restriction mapping, methods of DNA amplification and sequencing, southern hybridization, clonal hybridization.

**List of Recommended Reference Books**

1. Griffiths, A. J.; Wessler, S. R.; Lewontin, R. C.; Carroll, S. B., Introduction to Genetic Analysis 9th Edition, Freeman and Company (2008)
2. Watson, J. D.; Baker, T. A.; Bell, S. P.; Gann, A.; Levine, M.; Losick, R.; Molecular Biology of the Gene, 5th Edition, Pearson Education (2004)
3. B. Pierce, Genetics: A Conceptual Approach, 3rd Edition, Freeman & Co., (2008)
4. Peter Russell; iGenetics 2nd Edition, Pearson International, (2006)

5. Gupta, P.K. (1990). Genetics. Rastogi Publications
  6. Bernard R. Glick and Jack J. Pasternak Molecular Biotechnology: Principles and Applications of Recombinant DNA.
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**Practical: SBOTPR0501**

- I) Study Identification of cloning vectors, Ti plasmid for production of transgenic plants.
- II) Study of inheritance pattern with reference to plastid inheritance.
- III) Quantitative estimation of plant genomic DNA and RNA.
- IV) Isolation of onion DNA using agarose gel electrophoresis.
- V) Determine amino acid sequence in the protein molecule synthesized from given m-RNA strand.

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**T.Y. B.Sc. Botany**

**Course code: SBOT0502**

**Course Title: PLANT SYSTEMATICS**

**Learning Objectives:**

1. To keep the taxonomic Terminology in mind.
2. To use and understand the various classification systems of angiosperms.
3. To learn the various plant families and their economic importance.
4. To understand biodiversity and distribution of flora in India.

**Number of lectures: 60**

**Unit 1**

**(15 lectures)**

**Economic and Medicinal Botany**

Timber, oil and dye yielding plants. Beverages- tea and coffee. Botanical name, family, part used and uses of plants in these categories.

**Unit 2**

**(15 lectures)**

**Plant Systematics-I - Classification Systems**

Study of the various classifications systems: Cronquist, Takhtajan and APG I-III, introduction to botanical nomenclature (ICBN). Conservation: methods of plant conservation, Botanical Survey of India – its role in conservation of biodiversity, IUCN – Red Data Book.

**Unit 3**

**(15 lectures)**

**Plant Systematics-II - Angiosperm Families**

Study of the following families and their economic importance (Bentham and Hooker's system and current position in APG III System): Capparidaceae, Sterculiaceae, Tiliaceae, Solanaceae, Asclepiadaceae, Acanthaceae, Verbenaceae, Zingiberaceae, Cannaceae, Musaceae and Poaceae.

## **Unit 4**

**(15 lectures)**

### **Biodiversity**

Biodiversity- definition, levels, importance and status. Loss of Biodiversity- reasons, measures to conserve the biodiversity. Distribution of flora found in various forest types of India. Biodiversity Act, 2002.

### **List of Recommended Reference Books**

1. Dutta, A.C., A Class book of Botany. 15th edition. Calcutta. Oxford Univ. Press 1976.
  2. Simpson M. G. Plant Systematics 2nd, Academic Press, 2010.
  3. Sivarajan, V.V. Introduction to the principles of plant taxonomy 2nd ed. Cambridge Univ. Press. 1995.
  4. Stuessy Tod F., Plant Taxonomy: The Systematic Evaluation of Comparative Data. Columbia Univ. Press. 2008.
  5. Barry g. Hall, Phylogenetic tree made easy - How to ... Manual 3rd ed.
  6. Singh Gurcharan, Plant Systematics – Theory and Practice 3rd edition 2010.
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### **Practical: SBOTPR0502**

- I) Morphology and identification of timber, oil and dye yielding plants.
- II) Morphology, identification, botanical name, family and uses of Tea and Coffee plants / products.
- III) Study of families: minimum two species each from the families prescribed in theory.
- IV) Identification of Genus and Species.
- V) Field excursion.

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### **Evaluation and Assessment: SBOT0501 and SBOT0502 courses**

#### **Evaluation (Theory): Total marks per course - 100.**

##### **CIA- 40 marks**

CIA 1: Written test / Project -20 marks

CIA 2: Written Test / Assignment / Presentation / Field Trip / Project -20 marks

CIA 1 & CIA 2: Project – 40 marks

##### **End Semester Examination – 60 marks**

One question from each unit for 15 marks, with internal choice. Total marks per question with choice -20 to 25.

**Evaluation of SBOT5PR (Practical) Total marks per Practical course - 100.  
End Semester Practical Examination – (SBOTPR0501- 50 marks and SBOTPR0502- 50 marks)**

**Template for SBOT0501 Course End Semester Examination in Semester 5**

<b>UNITS</b>	<b>KNOWLEDGE</b>	<b>UNDERSTANDING</b>	<b>APPLICATION and ANALYSES</b>	<b>TOTAL MARKS- Per unit</b>
<b>1</b>	05	05	05	15
<b>2</b>	08	07	00	15
<b>3</b>	06	06	03	15
<b>4</b>	05	06	04	15
<b>-TOTAL - Per objective</b>	24	24	12	<b>60</b>
<b>% WEIGHTAGE</b>	40	40	20	<b>100%</b>

**Template for SBOT0502 Course End Semester Examination in Semester 5**

<b>UNITS</b>	<b>KNOWLEDGE</b>	<b>UNDERSTANDING</b>	<b>APPLICATION and ANALYSES</b>	<b>TOTAL MARKS- Per unit</b>
<b>1</b>	10	05	0	15
<b>2</b>	08	07	0	15
<b>3</b>	06	04	05	15
<b>4</b>	10	05	0	15
<b>-TOTAL - Per objective</b>	34	21	05	<b>60</b>
<b>% WEIGHTAGE</b>	56.66	35.00	8.33	<b>100%</b>

St. Xavier's College, Mumbai.  
**ASSESSMENT OF WRITTEN ASSIGNMENT- TYPE - I**

Dept. of Botany; Course Code \_\_\_\_\_ Date \_\_\_\_\_ Roll No \_\_\_\_\_

Name of student: \_\_\_\_\_ UIDNo \_\_\_\_\_ Marks \_\_\_\_\_ / 20

Title of Assignment: \_\_\_\_\_

**Assessment Grid :** Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows. In boxes that have more than one set of marks, cancel out the marks that are not applicable and circle the correct marks.

**Assessment of Written Assignment: 20 Marks**

100%	ASSIGNMENT	80-100% (17-20 Marks)	60-80% (13-16 Marks)	40- 60% (9-12 Marks)	20-40% (5-8 Marks)	0-20% (0-4 Marks)
60 %  12	<b>Content</b> Impression of wide reading (research), good knowledge and comprehensive understanding. Evidence of thoughtful input. Ability to critique, Bibliography mentioned ----- Marks -----	Excellent  12 / 11 / 10	Good  9 / 8	Satisfactory  7 / 6	Poor  5 / 4	Very Poor  3 / 2 / 1
30 %  06	<b>Organization</b> Effective presentation, logical format, clear statement of ideas, relevant details, sequence of information and ideas could be easily followed, references / footnotes / endnotes ----- Marks -----	Effective organization  6	Few problems  5	Many problems  4	Inadequate presentation. Ineffective format, communication of ideas, lack of relevant details – but an attempt  3	No attempt to organize  2
5%  01	<b>Vocabulary</b>  ----- Marks -----	Richness of vocabulary  1	Very good range of vocabulary with some errors  1	Good range of vocabulary with some errors  0.5	Small range of vocabulary with errors  0.5	Little of no effort to demonstrate vocabulary knowledge  0
5%  01	<b>Grammar, spellings, mechanics</b>  ----- Marks -----	Grammar, spellings punctuations correct  1	Very few errors  1	Some errors  0.5	Many errors  0.5	No effort  0

Comments:

Name and Signature of Faculty \_\_\_\_\_.

St. Xavier's College, Mumbai.  
**ASSESSMENT OF WRITTEN ASSIGNMENT- TYPE - II**

Dept. of Botany; Course Code \_\_\_\_\_ Date \_\_\_\_\_ Roll No \_\_\_\_\_

Name of student: \_\_\_\_\_ UIDNo \_\_\_\_\_ Marks \_\_\_\_\_ / 20

Title of Assignment: \_\_\_\_\_

**Assessment Grid :** Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows. In boxes that have more than one set of marks, cancel out the marks that are not applicable and circle the correct marks.

**Assessment of Written Assignment: 20 Marks**

100%	ASSIGNMENT	80-100% (17-20 Marks)	60-80% (13-16 Marks)	40- 60% (9-12 Marks)	20-40% (5-8 Marks)	0-20% (0-4 Marks)
50 %	<b>Content</b> Impression of wide reading (research), good knowledge and comprehensive understanding. Evidence of thoughtful input. Ability to critique, Bibliography mentioned ----- Marks -----	Excellent  10 / 9	Good  8 / 7	Satisfactory  6 / 5	Poor  4 / 3	Very Poor  2 / 1
30 %	<b>Organization</b> Effective presentation, logical format, clear statement of ideas, relevant details, sequence of information and ideas could be easily followed, references / footnotes / endnotes ----- Marks -----	Effective organization  6 / 5	Few problems  4	Many problems  3	Inadequate presentation. Ineffective format, communication of ideas, lack of relevant details – but an attempt 2	No attempt to organize  1
10%	<b>Vocabulary</b> ----- Marks -----	Richness of vocabulary  2	Very good range of vocabulary with some errors  1.5	Good range of vocabulary with some errors 1	Small range of vocabulary with errors 1	Little of no effort to demonstrate vocabulary knowledge 0.5
10%	<b>Grammar, spellings, mechanics</b> ----- Marks -----	Grammar, spellings punctuations correct 2	Very few errors  1.5	Some errors 1	Many errors 1	No effort 0.5

Comments:

Name and Signature of Faculty \_\_\_\_\_.

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**ASSESSMENT OF BOTANY FIELD TRIP REPORT**

Dept. of Botany; Course Code \_\_\_\_\_ Date \_\_\_\_\_ Roll No \_\_\_\_\_

Name of student: \_\_\_\_\_ UIDNo \_\_\_\_\_ Marks \_\_\_\_\_ / 20

Place of visit \_\_\_\_\_

**Assessment Grid :** Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows

(20)	Field Trip and Report	80-100% 17-20 Marks	60-80% 13-16 Marks	40-60% 09-12 Marks	20-40% 05-08 Marks	0-20% 0-04 Marks
30%  (06)	<b>Organization of report</b>  ----Marks---- -	Introduction about the location, vegetation, Botanical Names, Family, Local name, Description using Botanical Term, reporting all the species seen, Handwritten or typed.  6	Few mistakes, few species missing from the report  5	Many mistakes  4	Inadequate presentation, ineffective format, lack or relevant detail, but an attempt  3	No attempt to organize  2
50%  (10)	<b>Content</b>  ----Marks----	Excellent reporting of all the species observed in the field, ecological and morphological data,  10 / 9	Good reporting, species observed in the field but few of them missing in the list  8	Satisfactory, many species or relevant data missing from the report  6	Poor, inadequate and insufficient data or just a list of the species without any data.  5	Very poor, no data  4 / 3
10% (02)	<b>Conclusion</b>  ----Marks----	Excellent conclusion based on self observation. Type of forest and vegetation  2	Good conclusion, comments not independent  2 / 1	Satisfactory, but insufficient  1 / 0.5	Poor, irrelevant conclusion  0.5	Very poor, no conclusion  0.5
5% (01)	<b>References</b>  ----Marks---- -	Proper references, in required format  1	Proper references but no format  1	Few references  0.5	Irrelevant references  0	No references  0
5% (01)	<b>Attendance / participation</b>  ----Marks---- -	Attended and participated actively  1	Attended and participated  1	Infrequent Participation  0.5	No participation  0	Absent  0

Comments:

Name and Signature of Faculty \_\_\_\_\_.



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**ASSESSMENT OF INDIVIDUAL ORAL PRESENTATION -A**

Dept. of Botany; Course Code \_\_\_\_\_ Date \_\_\_\_\_ Roll No \_\_\_\_\_

Name of student: \_\_\_\_\_ UIDNo \_\_\_\_\_ Marks \_\_\_\_\_ / 20

Title of oral presentation: \_\_\_\_\_

**Assessment Grid :** Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows**Presentation: 30 % (06 marks)**

30%	PRESENTATION	80-100%	60-80%	40- 60%	20-40%	0-20%
10 %	<b>Presentation skills</b>	Varied rate of delivery, Changed pitch for emphasis, No distracting mannerisms ,good eye contact , Confident body language, Connected with audience	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	No speech variation, Distracting mannerisms, no eye contact, dull, and reading from notes/visual aids
2.0	----- Marks -----	2.0	1.5	1.0	1.0	0.5
10 %	<b>Use of Visuals ( Efforts to Aid Presentation)</b>	Very good, relevant visuals, good font size/ image size, Appropriate number of words and images per slide, good colour schemes	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	Very poor visuals, visuals did not contribute to the presentation
2.0	----- Marks -----	2.0	1.5	1.0	1.0	0.5
5%	<b>Timing and Pace of Talk</b>	Right length and well paced	Right Length but too slow or too rushed	Long or short <b>and</b> too slow or too rushed	Too long <b>or</b> too short	Had to be stopped <b>or</b> less than 50% of the allocated time
01	----- Marks -----	1.0	0.5	0.5	0	0
5%	<b>Audibility and Comprehensibility</b>	Very clear and very precise	Clear, quite precise	Almost inaudible <b>and</b> difficult to understand	Almost inaudible <b>or</b> very difficult to understand	Inaudible <b>or</b> completely incomprehensible
01	----- Marks -----	1.0	1.0	0.5	0.5	0

Total marks for presentation: \_\_\_\_\_ out of 06 marks.

**Content: 70% (14 Marks)**

70%	CONTENT	80-100%	60-80%	40- 60%	20-40%	0-20%
35%	<b>Knowledge and Understanding Innovation</b> Impression of wide reading, good knowledge and complete understanding 07 ----- Marks -----	Excellent  7.0	Good  6.0 / 5.0	Satisfactory  4.0 / 3.0	Poor  2.0	Very Poor  1.0
10%	<b>Structure of Presentation</b> Logical Structure, Clear Introduction, Body and Relevant Conclusion, sequence of information and ideas could be easily followed , Citation of source material 02 ----- Marks -----	Excellent  2.0	Good  2.0	Satisfactory  1.0	Poor  0.5	Very Poor  0.5
5%	<b>Key Points/ Themes</b> Identified Key Points, Kept to the points throughout the presentation- did not wander 01 ----- Marks -----	Excellent  1.0	Good  1.0	Satisfactory  0.5	Poor  0.5	Very Poor  0
10%	<b>Ability to answer Questions</b> Answers accurate and full of confidence 02 ----- Marks -----	Excellent  2.0	Good  1.5	Satisfactory  1.0	Poor  0.5	Very Poor  0
10%	<b>Creation of Interest/ Audience Participation</b> Created interest in the topic 02 ----- Marks -----	Excellent  2.0	Good  1.5	Satisfactory  1.0	Poor  1.0	Very Poor  0.5

Total for content: \_\_\_\_\_ out of 14; Total marks for oral presentation: \_\_\_\_\_ out of **20**

Comments:

Name of the Faculty \_\_\_\_\_.

Signature of the Faculty \_\_\_\_\_

St. Xavier's College, Mumbai.

**ASSESSMENT OF INDIVIDUAL ORAL PRESENTATION -B**

Dept. of Botany; Course Code \_\_\_\_\_ Date \_\_\_\_\_ Roll No \_\_\_\_\_

Name of student: \_\_\_\_\_ UIDNo \_\_\_\_\_ Marks \_\_\_\_\_ / 20

Title of oral presentation: \_\_\_\_\_

**Assessment Grid :** Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows**Presentation: 40 % (8 marks)**

40%	PRESENTATION	80-100%	60-80%	40- 60%	20-40%	0-20%
15 %	<b>Presentation skills</b>	Varied rate of delivery, Changed pitch for emphasis, No distracting mannerisms ,good eye contact , Confident body language, Connected with audience	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	No speech variation, Distracting mannerisms, no eye contact, dull, and reading from notes/visual aids
03	----- Marks -----	3.0	2.5	2.0	1.5	1.0
15 %	<b>Use of Visuals ( Efforts to Aid Presentation)</b>	Very good, relevant visuals, good font size/ image size, Appropriate number of words and images per slide, good colour schemes	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	Very poor visuals, visuals did not contribute to the presentation
03	----- Marks -----	3.0	2.5	2.0	1.5	1.0
5%	<b>Timing and Pace of Talk</b>	Right length and well paced	Right Length but too slow or too rushed	Long or short <b>and</b> too slow or too rushed	Too long <b>or</b> too short	Had to be stopped <b>or</b> less than 50% of the allocated time
01	----- Marks -----	1.0	1.0	0.5	0.5	0
5%	<b>Audibility and Comprehensibility</b>	Very clear and very precise	Clear, quite precise	Almost inaudible <b>and</b> difficult to understand	Almost inaudible <b>or</b> very difficult to understand	Inaudible <b>or</b> completely incomprehensible
01	----- Marks -----	1.0	1.0	0.5	0.5	0

Total marks for presentation: \_\_\_\_\_ out of 08 marks.

**Content: 60% (12 Marks)**

60%	CONTENT	80-100%	60-80%	40- 60%	20-40%	0-20%
25%	<b>Knowledge and Understanding Innovation</b> Impression of wide reading, good knowledge and complete understanding ----- Marks -----	Excellent	Good	Satisfactory	Poor	Very Poor
05		5.0	4.0	3.0	2.0	1.0
10%	<b>Structure of Presentation</b> Logical Structure, Clear Introduction, Body and Relevant Conclusion, sequence of information and ideas could be easily followed , Citation of source material ----- Marks -----	Excellent	Good	Satisfactory	Poor	Very Poor
02		2.0	1.5	1.0	0.5	0.5
5%	<b>Key Points/ Themes</b> Identified Key Points, Kept to the points through out the presentation- did not wander. ----- Marks -----	Excellent	Good	Satisfactory	Poor	Very Poor
01		1.0	1.0	0.5	0.5	0
10%	<b>Ability to answer Questions</b> Answers accurate and full of confidence ----- Marks -----	Excellent	Good	Satisfactory	Poor	Very Poor
02		2.0	1.5	1.0	0.5	0
10%	<b>Creation of Interest/ Audience Participation</b> Created interest in the topic. ----- Marks -----	Excellent	Good	Satisfactory	Poor	Very Poor
02		2.0	1.5	1.0	0.5	0

Total for content: \_\_\_\_\_ out of 12; Total marks for oral presentation: \_\_\_\_\_ out of **20**

Comments:

Name of the Faculty \_\_\_\_\_.

Signature of the Faculty \_\_\_\_\_