Mohanlal Sukhadia University

Udaipur

Department of Biotechnology

Syllabus and Scheme of Examination

For

M.Sc. CBCS Programme Biotechnology

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M. Sc. Biotechnology (CBCS)

Total Seats: 30

(Seats with normal fees: 8, Self Finance Seats: 22)

*** Eligibility**: B. Sc. with a minimum of 50% marks**. Candidates from outside the state of Rajasthan should possess a minimum of 60% marks to seek admission. A candidate should have studied any two of the following subjects for at least two years at the under graduate level: Botany, Zoology, Chemistry, Microbiology, Biochemistry and Biotechnology. Candidates with B.Sc. in Biotechnology, Genetics, Microbiology, Biochemistry, Biomedical Science, Biomedical Technology, Genetic engineering, Genetics, Agriculture, Life Sciences, Biosciences, Food Science, Food Technology, Forensic Science, B. Pharma and other relevant subjects are also eligible for admission.

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Department of Biotechnology
Mohanlal Sukhadia University
Syllabus of M.Sc. Biotechnology CBCS Scheme

Type of course	Course code	Title of the Course	L-T-P/Week	No. of credits	University exam	Internal assessment	Total
Semester I							
Core course 1	M1BT01CT01	Instrumentation and Analytical Techniques	3-1-0	4	80	20	100
Core course 2	M1BT02CT02	Cell Biology and Molecular Genetics	3-1-0	4	80	20	100
Core course 3	M1BT03CT03	Fundamentals of Microbiology	3-1-0	4	80	20	100
Core course 4	M1BT04CT04	Biomolecules and Metabolism	3-1-0	4	80	20	100
Core course practical 1	M1BT05CP01	Instrumentation and Analytical Techniques + Cell Biology and Molecular Genetics	0-0-8	4	80	20	100
Core course practical 2	M1BT06CP02	Fundamentals of Microbiology + Biomolecules and Metabolism	0-0-8	4	80	20	100
Skill course 1	M2BT07SEC01	Any one from the given list	1-0-2	2	80	20	100
				26	**560**	**140**	**700**
Semester II							
Core course 5	M2BT01CT05	Molecular Biology	3-1-0	4	80	20	100
Core course 6	M2BT02CT06	Immunology and Enzymology	3-1-0	4	80	20	100
Core course 7	M2BT03CT07	Bioinformatics and Biostatistics	3-1-0	4	80	20	100
Core course 8	M2BT04CT08	Genetic Engineering	3-1-0	4	80	20	100
Core course practical 3	M2BT05CP03	Molecular Biology + Immunology and Enzymology	0-0-8	4	80	20	100
Core course practical 4	M2BT06CP04	Bioinformatics and Biostatistics + Genetic Engineering	0-0-8	4	80	20	100
				24	**480**	**120**	**600**
Semester III							
Core course 9	M3BT01CT09	Environmental Biotechnology	3-1-0	4	80	20	100
Core course 10	M3BT02CT10	Animal Biotechnology	3-1-0	4	80	20	100
Core course 11	M3BT03CT11	Plant Biotechnology	3-1-0	4	80	20	100
Core course 12	M3BT04CT12	Fermentation Technology	3-1-0	4	80	20	100
Core course practical 5	M3BT05CP05	Environmental Biotechnology + Animal Biotechnology	0-0-8	4	80	20	100
Core course practical 6	M3BT06CP06	Plant Biotechnology + Fermentation Technology	0-0-8	4	80	20	100
Skill course 2	M3BT07SEC02	Any one from the given list	1-0-2	2	80	20	100
				26	**560**	**140**	**700**

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Semester IV : Choice of A or B							
A.	**Industrial Training**	Major Research Project (at research laboratory or institute of repute (5 months)	0-0-8	**24**	**480***	**120**	**600**
B.	**DSE**						
Discipline Specific Elective 1	M4BT01ET01	Minor Research Project	3-1-0	4	80	20	100
Discipline Specific Elective 2	M4BT02ET02 (a/b)	Choose any one from the given list	3-1-0	4	80	20	100
Discipline Specific Elective 3	M4BT03ET03 (a/b)	Choose any one from the given list	3-1-0	4	80	20	100
Discipline Specific Elective 4	M4BT04ET04 (a/b)	Choose any one from the given list	3-1-0	4	80	20	100
Discipline Specific Elective practical	M4BT05EP01	Practical 1 DSE	0-0-8	4	80	20	100
Discipline Specific Elective practical	M4BT06EP02	Practical 2 DSE	0-0-8	4	80	20	100
				24	**480**	**120**	**600**
GRAND TOTAL				**100**	**2080**	**520**	**2600**

*480 : (Project dissertation 200 + Presentation 150 + Viva- Voce100, Scientific paper: 30)

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Core Course

S.No.	Type of course	Semester	Course code	Title of the Course
1.	Core course 1	I	M1BT01CT01	Instrumentation and Analytical Techniques
2.	Core course 2	I	M1BT02CT02	Cell Biology and Genetics
3.	Core course 3	I	M1BT03CT03	Fundamentals of Microbiology
4.	Core course 4	I	M1BT04CT04	Biomolecules and Metabolism
5.	Core course 5	II	M2BT01CT05	Molecular Biology
6.	Core course 6	II	M2BT02CT06	Immunology and Enzymology
7.	Core course 7	II	M2BT03CT07	Bioinformatics and Biostatistics
8.	Core course 8	II	M2BT04CT08	Genetic Engineering
9.	Core course 9	III	M3BT01CT09	Environmental Biotechnology
10.	Core course 10	III	M3BT02CT10	Animal Biotechnology
11.	Core course 11	III	M3BT01CT11	Plant Biotechnology
12.	Core course 12	III	M3BT01CT12	Fermentation Technology

Core Course Practical

S.No.	Type of course	Semester	Course code	Title of the Course
1.	Core course practical 1	I	M1BT05CP01	Instrumentation and Analytical Techniques + Cell Biology and Genetics
2.	Core course practical 2	I	M1BT06CP02	Fundamentals of Microbiology + Biomolecules and Metabolism
3.	Core course practical 3	II	M2BT05CP03	Molecular Biology + Immunology and Enzymology
4.	Core course practical 4	II	M2BT06CP04	Bioinformatics and Biostatistics + Genetic Engineering
5.	Core course practical 5	III	M3BT05CP05	Environmental Biotechnology + Animal Biotechnology
6.	Core course practical 6	III	M3BT06CP06	Plant Biotechnology + Fermentation Technology

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Skill Enhancement Course Elective

S.No.	Type of course	Semester	Course code	Title of the Course
1.	Skill course 1	II	M2BT07SEC01	Skill course elective 1 (Techniques of Molecular Biology) **(any one)**
2.	Skill course 2	III	M3BT08SEC02	Skill course elective 2 (Techniques of Plant Biotechnology) (**any one)**

Discipline Specific Elective

S.No.	Type of course	Semester	Course code	Title of the Course
1.	**A. Industrial Training**	IV		Major Research Project (at research laboratory or institute of repute (5 months)
2.	**B.**			
3.	Discipline Specific Elective 1	IV	M4BT01ET01	Minor Research Project (Compulsory)
4.	Discipline Specific Elective 2(a)	IV	M4BT02ET02	Agriculture Biotechnology
5.	Discipline Specific Elective 2(b)	IV	M4BT03ET02	Biosafety, Bioethics and IPR
6.	Discipline Specific Elective 3(a)	IV	M4BT04ET03	Food and Dairy Biotechnology
7.	Discipline Specific Elective 3(b)	IV	M4BT05ET03	Advanced Biotechnology
8.	Discipline Specific Elective 4(a)	IV	M4BT05ET04	Medical and Pharmaceutical Biotechnology
9.	Discipline Specific Elective 4(b)	IV	M4BT05ET04	Host-Parasite Interactions

Discipline Specific Elective Practical

S.No.	Type of course	Semester	Course code	Title of the Course
1.	Discipline Specific Elective practical 1,	IV	M4BT06EP01	Based on Choice of DSE
2.	Discipline Specific Elective practical 2	IV	M4BT07EP02	Based on Choice of DSE

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NOTE:

1. In 4th semester the students have an option of either doing Major research project (MRP) for 5 months in a government institution other than parent university or take any four DSE electives.
2. Students opting for MRP in 4th semester will have to complete SEC 2 in 3rd semester.
3. The students opting for MRP will have to take prior permission from the HOD at least 3 months in advance and submit their acceptance letter from the institute where he/she is going to do the training one month in advance. Failing this the student will not be permitted to go for training.
4. The student who opts for MRP will have submit a duly signed and sealed certificate from the mentor and competent authority in the prescribed format (Annexure 1)
5. Student will be required to submit a hard copy of the continuous assessment report prepared by the mentor as per the prescribed format filled in a sealed envelope. The mentor will also have to send a soft copy of the same to the HOD. (Annexure 2)
6. Such students will also have to submit a dissertation report as per the prescribed format for the training. (Annexure 3)
7. Such students will also have to submit a research paper based on the research work done which may or may not have been published in any journal.
8. The total credits for the MRP will be 24 and the student will maintain a log book showing the presence for 32 hrs./week in the institution and submit the same along with the dissertation. Evaluation of the MRP will be done as per the prescribed scheme. (Annexure 4)
9. In the 4th semester students who opt to take four DSEs also have an alternative option of taking one in-house minor research project within the department or in sister departments of this University in lieu of one DSE. Such students will also have to submit a dissertation report as per the prescribed format for the training. (Annexure 3)
10. The total credits and marks for minor research project will be the same as for any other DSE and Evaluation of the minor research project will be done as per the prescribed scheme. (Annexure 5)

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11. The total contact hrs. for minor research project will be 8 hrs./week. The student who opts for industrial training will have submit a duly signed and sealed certificate from the mentor and competent authority in the prescribed format (Annexure 6)
12. Students can choose skill courses from the list provided in the syllabi of B. Sc. CBCS Biotechnology, M.Sc. Biotechnology, M. Sc. Botany, M. Sc. Microbiology or any other subject from the faculty of Science. The student also has the choice of choosing any general skill courses offered by College of Science
13. Students can also earn extra credits by taking addition skill courses during entire program period.

ANNEXURE 1

INSTITUTE NAME AND LOGO

Ref no.-…….. Date……

CERTIFICATE

This is to certify that the dissertation/project report entitled "**……**" submitted towards the partial fulfillment for the award of the degree of Master of Science in Biotechnology, from Mohanlal Sukhadia University, Udaipur (Rajasthan) India is the result of bonafide work compiled by **Mr./Ms. …….** carried outunder the guidanceof **Dr. ……..** at **……..** under my supervision in the academic year of …….. It has no part the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journals or magazines.

Date

Name & Signature of the supervisor

Seal of the supervisor

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ANNEXURE 2

M. Sc. Biotechnology Semester IV

CONTINUOUS ASSESSMENT SHEET

Major Research Project

Name of Student:

A) Technical Competence	**Maximum Marks**	**Marks Obtained**
1. Experimental Design	7	
2. Handling of Equipments	7	
3. Experimental Skills	7	
4. Data Interpretation/ Result Analysis	**7**	
5. Technical Writing Skills	7	
TOTAL	**35**	
B) Professional Qualities		
1. Sincerity and Reliability	5	
2. Drive and Initiative	5	
3. Motivation to exceed minimum expectation	5	
4. Attendance	30	
TOTAL	**45**	
C) Ability to		
1. Work Independently	4	
2. Understand technical (Research Publication)	4	
3. Adjust in new working environment	4	
4. Plan and work Methodically	4	
5. Work in team	4	
TOTAL	**20**	
D) Communication Skills		
1. Written	10	
2. Oral	10	
TOTAL	**20**	
Grand Total	**120**	

Remark on professional competence (or deficiency) of the trainee and overall performance.

Name of the Mentor :

Designation : E-mail…….

Ph. No.

Organization:

Date: Signature with seal

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ANNEXURE 3

General Guidelines for Preparation of Project Report

(For specific details the students are advised to consult their respective supervisors)

1. Strictly follow the format given to write the manuscript of the project.
2. On the front page include title of the project (font size 21, centered). The title should not contain abbreviation and scientific names of organisms should be in *italics*. This page should not be numbered.
3. Starting from second page, the pages must be numbered consecutively, including figures and table.
4. Text should be 1.5 point spaced type written using Times New Roman Font, Font Size 12, on one side of A 4 Size paper, with 1.5 inch margins throughout. Scientific names of the organisms should be in *italics.* Main headings (Summary, Introduction, Chapter details, Conclusions and References) should be bold type, justified and separated from the text.
5. The full text of project should not exceed 20-25 one side typed pages.
6. Literature citation in the text should be cited in alphabetic order. The form and style of references should be as indicated below.

(a) Journal article

Carvalho, L.C., Goulao, L., Oliveira, C., Goncalves, C.J. and Amancio, S. 2004. Rapid assessment for identification of clonal identity and genetic stability of *in vitro* propagated chestnut hybrids. Plant Cell Tiss. Org. Cult. 77:23-27.

Chae, W.B., Choi, G.W. and Chung, I.S. 2004. Plant regeneration depending on explant type in *Chrysanthemum coronarium* L. J. Plant Biotech. 6:253-258.

(b) Book reference

Salisbury, F. B., Ross, C. W. 1992. Plant Physiology. 4th edn. Wadsworth Publishing Company. Belmount.

(c) Edited books

Constantine, D.R. 1986. Micropropagation in the commercial environment. In : "Plant Tissue Culture and its Agricultural Applications". L.A. Withers and P.G. Alderson (Eds.) pp. 175-186. Butterworths, London, UK.

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(d) Paper presented at a conference

Chaturvedi, H.C. 1992. Hardening of *in vitro* raised plants for transplant success. A state of art report. Paper presented in DBT Project Monitoring Committee Meeting held on 6th-7th July, 1992 in DBT, New Delhi, India.

(e) Proceeding of a symposium

Rajsekharan, P. E., Ganeshan, S. 2005. Designing *exsitu* conservation strategies for threatened medicinal plant species of South India. In: " Proc. Natl. Symp. and 27th Annual Meeting of PTCA(I)." A.K. Kukreja *et al* (Eds). Pp.159-164. CIMAP, Lucknow, India.

(f) Thesis/ Dissertation

Dave, N. 2004. Factors influencing micropropagation of two varieties of *Achras sapota* and their rootstock *Mimusops hexandra*. Ph.D. Thesis, Mohanlal Sukhadia University, Udaipur, India.

(g) Patent

Trepaginer, J.H. 2000. New surface finishings and coatings. US Pat 1276323 (to DuPont Inc, USA). 27 June, 2000. Chem Abstr, 49 (2000) 27689.

(h) Reports

Anonymous, 1976. The Wealth of India. Raw Meterials. Vo. X. pp. 44-48. CSIR, New Delhi, India.

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TITLE MUST BE IN CAPITAL LETTERS, SIZE 21 AND CENTERED, WITH *Scientific names* IN ITALICS

A Project Report submitted

for the partial fulfillment of the Degree of Master of Science

By

(**Name of student**)

[M.Sc. (Biotechnology/Microbiology), IV Semester]

DEPARTMENT OF BIOTECHNOLOGY

Vigyan Bhawan- Block 'B': New Campus

MOHANLAL SUKHADIA UNIVERSITY

UDAIPUR

2015-16

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INSTITUTE NAME AND LOGO

Ref no.-…….. Date……

CERTIFICATE

This is to certify that the dissertation/project report entitled "**……**" submitted towards the partial fulfillment for the award of the degree of Master of Science in Biotechnology, from Mohanlal Sukhadia University, Udaipur (Rajasthan) India is the result of bonafide work compiled by **Mr./Ms. ……..** carried outunder the guidance of **Dr. ……** at **……..** under my supervision in the academic year of ……..

It has no part the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journals or magazines.

Date

Name & Signature of the supervisor

Seal of the supervisor

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Declaration

I, **……..** Roll No. **_____**student of M. Sc. IV Semester Biotechnology (Session 2010-11) hereby declare that the project entitled "……." is my own compilation. I have strictly adhered to the guidelines provided by the department for the preparation of the project report.

Dated: Signature of the Student

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ANNEXURE 4

MARKING SCHEME FOR MAJOR RESEARCH PROJECT

M. Sc. Biotechnology semester IV

S. No.		Maximum Marks	Marks Obtained
1	**Dissertation Report** a. Review of Literature b. Methodology c. Outcome d. Discussion	 100 50 30 20	
2	Presentation	150	
3	Viva – voce	100	
4	Research Paper	30	
5	Continuous Assessment	120	
	TOTAL MARKS	**600**	

ANNEXURE 5

MARKING SCHEME FOR MINOR RESEARCH PROJECT

M. Sc. Biotechnology semester IV

S. No.		Maximum Marks	Marks Obtained
1	**Dissertation Report** a. Review of Literature b. Methodology c. Outcome	 15 10 15	
2	Seminar	25	
3	Viva – voce	15	
4	Continuous Assessment	20	
	TOTAL MARKS	**100**	

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ANNEXURE 6

CONTINUOUS ASSESSMENT SHEET

M. Sc. Biotechnology: Minor Research Project

Name of Student's :

Technical Competence	Maximum Marks	Minimum Marks
• Review of Literature	5	
• Experimental Design & Skills	5	
• Data Interpretation/ Result Analysis	5	
• Attendance	5	
GRAND TOTAL	**20**	

Remark on professional competence (or deficiency) of the trainee and overall performance.

Name :

Designation : E-mail…….

Ph. No.

Organization:

Date: Signature with seal