आंध्रप्रदेश केंद्रीय विश्वविद्यालय

CENTRAL UNIVERSITY OF ANDHRA PRADESH

Ananthapuramu

Postgraduate Programme Structure
as per the UGC Credit Framework (NEP 2020)

Vidya Dadati Vinayam
(Education Gives Humility)

M.Sc. Molecular Biology

"Our own genomes carry the story of evolution, written in DNA, the language of molecular genetics, and the narrative is unmistakable."

-Kenneth R. Miller

Programme Structure
(With effect from AY 2024 - 25)

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Introduction to the programme

The Molecular Biology program at the Central University of Andhra Pradesh is designed to provide students with a holistic understanding of macromolecules that is Nucleic acids, Proteins, lipids and microorganisms, by integrating theoretical knowledge with practical applications. The program aims to produce competent and well-equipped graduates, who are capable of making meaningful contributions in the molecular biology related research and theoretical knowledge experience. Over the course of four semesters, students explore core subjects and specialized electives structural Biology, Bodiversity & Evolutionary Biology,cell signal transduction, Developmental Biology and Metabolic engineering and emerging domains such as artificial intelligence and mathematical ability. By adopting a multidisciplinary approach, the program equips graduates with versatile expertise suitable for diverse roles in Biotechnological, molecular microbial industries, Seeds industry, Crop development industries and Genome research related industries. Through internships following the second semester and project work in the final semester, students gain hands-on experience, refining their skills and preparing them for real-world challenges. These practical components not only deepen students' understanding but also foster professional growth, ensuring they are well-equipped to thrive in various professional settings.

Programme Vision

Instill knowledge, skills, and abilities to enrich the qualities of strength, thoughtfulness, and resilience to nurture intellectual curiosity, foster diversity, and cultivate a passion for lifelong learning to shape future scientists, industrialists, and academicians.

Programme Objectives

The purpose of this program is to:

M.Sc. Molecular Biology is one of the fine new Post Graduate programme being offered by CUAP in the 2022-23 academic year. This programme provides the students with a great opportunity for job-seeking, higher education, and research. While preparing the syllabus of the core courses and the basket elective courses one has to take into account to provide the following points.

- The core courses should help the students to write the competitive examinations on (like CSIR-UGC NET) to pursue molecular biology in later years.
- The courses should facilitate the student to seek jobs in many industries as junior scientists and scientists.
- After completion of this programme students can be able to get knowledge to establish new start-up companies
- Students can join in research institutes as a JRF, SRF and Project scientists. If they have ability to do research they can move abroad to continue their in good institutes or universities.

Learning Outcomes

Upon the completion of this program, the students should be able to:

- Demonstrate advanced knowledge and understanding of core concepts, theories, and principles in areas such as Biomolecules, microbiology, cell biology, molecular biology, genetic engineering and genomics and proteomics.
- Possess strong analytical and research skills, including the ability to gather, analyze, and interpret data to support decision-making and solve the problems which will come in seed industries, diagnostic industries, and pharmacy industries.
- Recognize the importance of lifelong learning and professional development, with the ability to adapt to new technologies, trends, and challenges in the field of molecular Biology.

Program Structure

- The M.Sc. Molecular Biology is a two-year program divided into four semesters with a total of around 86 credits.
- The program is designed with the combination of Core Courses, Discipline Specific Electives, Multi disciplinary Courses, and MOOCS.
- The program consists of 6 discipline specific electives, comprising wide range of courses from the disciplines catering to the present industry requirement.
- In Semester-II and III, students will select 1 Discipline Specific Elective as their functional specialization and will study all the courses mentioned.
- In Semester II and III, 1 multi-disciplinary elective offered by other departments will be selected by the students.
- Students need to complete1 MOOCS Course in each I, II and III Semester.
- Students will undergo for 45 to 60 days summer internship after II semester and submit internship in III semester.
- In semester IV students will undergo for 6 months Project Work.

M.Sc. Molecular Biology Semester and Course wise Credits

Semester	Discipline Specific Core (DSC) (L+T+P)	Discipline Specific Elective (DSE) / Elective (EL)	Project Work Dissertation	Inter- Disciplinary Elective (IDE)	Common Compulsory Course (CCC)	Internship	Lab	Total Credits
I	DSC 1 (4) DSC 2 (4) DSC 3 (4) Add-on / SEC (2)	Elective-1(4) DSE- 1 DSE - 2	-	MOOC-1 (3)			DSC-1 Lab: (1) DSC-2 Lab: (1) DSC-3 Lab: (1)	**24**
II	DSC 4 (4) DSC 5 (4) DSC 6 (4)	Elective- II (4) DSE-1 DSE-2	-	MOOC-1I (3)	CCC -2 AI &ML (4)		DSC-4 Lab: (1) DSC-5 Lab: (1) DSC-6 Lab: (1)	26
III	DSC 7 (4) DSC 8 (4) DSC 9 (4)	Elective- III (4) DSE-1 DSE-2		MOOC-1II (3)	CCC-1 Building Mathematical Ability (4)	Internship (2)	DSC-7 Lab: (1) DSC-8 Lab: (1) DSC-9 Lab: (1)	28
IV	DSC 10 (4)	-	Dissertation (16)				-	20
Total	**42**	**12**	**16**	**9**	**8**	**2**	**09**	**98**
Percentage	**42.86**	**12.24**	**16.33**	**9.18**	**8.17**	**2.04**	**9.18**	**100**

IDE: Interdisciplinary Elective **AECC**: Ability Enhancement Compulsory Course **SEC:** Skill Enhancement Courses **VAC:** Value-Added Courses
MOOCs: Massive Open Online Course

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M.Sc. Molecular Biology

Programme Structure with Course Titles

Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
Semester I						
1	MMB-101	Bio molecules and Biochemistry	4	3	1	0
2	MMB-102	Cell Biology	4	3	1	0
3	MMB-103	Microbiology and Microscopy	4	3	1	0
4	Any one of the following electives		4	3	1	0
	MMB-111	Biophysics and Structural Biology				
	MMB-112	Biodiversity and Evolutionary Biology				
5	MMB-113	MOOC	3	3	0	0
6	MMB-114	Academic Writing	2	2	0	0
7	Practicals					
	MMB-125-L	Lab-I (Based on MMB-101,102,103)	3	0	0	3
Total			**24**	**16**	**5**	**3**
Semester II						
1	MMB-201	Immunology	4	3	1	0
2	MMB-202	Molecular Biology	4	3	1	0
3	MMB-203	Genetic Engineering and Genome	4	3	1	0
4	Any one of the following electives		4	3	1	0
	MMB-211	Signal Transduction and Cancer Biology				
	MMB-212	Biostatistics and Bioinformatics				
5	MMB-213	MOOC-II	3	3	0	0
6	MMB-214	CCC -2 (AI &ML)	4	2	0	2
7	Practicals					
	MMB-225	Lab-II (Based on MMB-201,202,203)	3	0	0	3
Total			**26**	**16**	**4**	**5**

Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
Semester III						
1	MMB-301	Plant Physiology	4	3	1	0
2	MMB-302	Animal Physiology	4	3	1	0
3	MMB-303	Genomics and Proteomics	4	3	1	0
4	Any one of the following electives		4	3	1	0
	MMB-311	Developmental Biology				
	MMB-312	Metabolomics and Metabolic				
5	MMB-313	Internship	2	2	0	0
6	MMB-314	MOOC-III	3	3	0	0
7	MMB-315	CCC-1	4	3	1	0
8	Practicals					
	MMB-325	Lab-III (Based on MMB-301,302,303)	3	0	0	3
Total			**28**	**20**	**5**	**3**
Semester IV						
1	MMB-401	Advanced Molecular Biology Techniques	4	3	1	0
2	MMB-402	Project Work/Dissertation	16	0	0	16
Total			**20**	**3**	**1**	**16**
Grand Total			**98**	**56**	**14**	**27**

L: Lectures; S: Seminars; P: Presentations; T: Tutorials

*Internship shall be completed before the commencement of IV-Semester.

Note1: Total number of credits may go beyond 86 depending on the credits of MOOC courses

Note 2: Exit option with PG Diploma / B.Sc., Honours after II semester with open elective (44credits).

Any Online/MOOC course taken by the student must be approved by a competent authority

Semester-Wise Credit Distribution

Semester	Total Credits	Cumulative credit at the end of the semester
I	24	24
II	26	50
III	28	78
IV	20	98

Required Credit : The minimum required credit to be earned by the student to award the degree is 91. However, they can earn credits in excess of 91 by taking other courses. The upper limit will be 95 credits.

Assessment Pattern:
Theory Course: 40% of internal [formative evaluation -- two best out of three tests (for a maximum of 15 marks each = 30marks) -- and seminar/ assignments/ attendance (10 marks)] and 60% (summative evaluation -- endof semester examination)
Lab components: 60% of internal exam/lab and 40% (summative evaluation
-- end of semester examination)

End Semester Examination

Maximum Marks: 60 Time: 3 Hours

Dissertation

Dissertation/Project report: Evaluation - 60 marks
Viva-Voce - 40 marks

Important Information to Students

1. Programme: M.Sc. Molecular Biology

2. Eligibility: Candidate with a Bachelor's degree in any branch of Life Sciences (Zoology, Botany, Microbiology, Biotechnology, Bio- informatics, Genetics or equivalent), Chemical, Medical, Veterinary, Pharmacy, and Agricultural Sciences.

3. The minimum duration for completion of the programme is four semesters (two academic years) and the maximum duration is eight semesters (four academic years) or as per amendments made by the regulatory bodies from time to time.

4. A student should attend at least 75% of the classes, seminars, and practicals in each course of study.

5. All theory courses in the programme carry a Continuous Internal Assessment (CIA) component to a maximum of 40 marks and for End Semester Examination (ESE) for a maximum of 60 marks. The minimum pass marks for a course is 40%. All lab components carry a Continuous Internal Assessment (CIA) component to a maximum of 60 marks and End Semester Practical Examination (ESE) for a maximum of 40 marks. The minimum pass marks for a course is 40%.

6. A student should pass separately in both CIA and ESE, i.e., student should secure 16 (40% of 40) out of 40 marks for theory and 24 (40 % of 60) out of 60 marks for lab components in the CIA. Therefore, a student should secure 24 (40 % of 60) out of 60 marks for theory and 16 (40 % of 40) out of 40 marks for lab components in the end semester examination.

7. A student failing to secure the minimum pass marks in the CIA is not allowed to take the end semester examination of that course. She/he has to redo the course by attending special classes for that course and get the pass percentage in the internal tests to become eligible to take the end- semester examination.

8. Students failing a course due to lack of attendance should redo the course.

9. Re-evaluation is applicable only for theory papers and shall not be entertained for other components such as practicals / thesis / dissertation / internship, etc.

10. An on-campus elective course is offered only if a minimum of ten or 40% of the students registered, whichever is higher, exercise their option for that course.

Marks for the Attendance will be considered as follows:

S.NO	ATTENDANCE %	MARKS
1	95% or more	5
2	90-94%	4
3	85-89%	3
4	80-84%	2
5	75-79%	1