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. in Space Science & Technology

Programme Structure

(With effect from AY 2024 - 25)

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About the Program

MSc The new generation course MSc. Space Science forms the final formal training of Physics with a specialization in Space Science. The program aims to provide in-depth knowledge of Physics together with concepts of Atmospheric and Space Science to the students. After completing the program, a student should pursue research in theoretical/experimental Physics, Astrophysics, Space Science and related areas. The student is expected to acquire a thorough understanding of the fundamentals of Physics and concepts of atmospheric and space science to select an academic career at the secondary or tertiary level. The program also aims at enhancing

the employability of the student. Rigorous training requires phased teaching. With this intention, the credit and semester system is followed in this program. An M.Sc. student should be capable of researching at least in a preliminary way. To this aim, an oriented research project is made part of the curriculum.

Program Vision:

Grooming students for India's Atmospheric Science Studies and Space Research.

Programme Objectives:

- To develop a strong foundation in the fundamental principles of space science, including physics, astronomy, and astrophysics.
- Foster interdisciplinary thinking by integrating knowledge from various scientific and engineering disciplines.
- Cultivate a research-oriented mindset, encouraging students to explore cutting-edge technologies and contribute to the field

  A Student completing this programme will be capable of taking a career path in the domain of Space Sciences.

Programme Outcomes:

On successful completion of the programme student should be able to:

- Demonstrate a comprehensive understanding of the fundamental principles of space science, including astronomy, astrophysics, and planetary science.
- Collaborate effectively in interdisciplinary teams, demonstrating the ability to work with professionals from diverse backgrounds in the space industry.
- Be prepared to pursue further studies at the doctoral level or enter the workforce with the skills and knowledge required for various roles in academia, research institutions, space agencies, and private industries.

Pedagogy of the program:

The Space Technology pathway is focused on the application of space technology in industrial settings, its main objective is to provide a sound knowledge of the underlying principles which form a thorough basis for careers in space technology, satellite communications and related fields. Students develop a thorough understanding of the fundamentals of:

- spacecraft, satellite communications, the space environment, space operations and space project management;
- the electromagnetics of optical and microwave transmission, and of communication systems modelling;
- a range of subjects relating to spacecraft technology and satellite communications.

Program Structure:

- M.Sc Space Science and Technology is a two-year program divided into four semesters with a total of around 97 credits.
- The program is designed with the combination of Core Courses, Discipline Specific Electives, Multidisciplinary Courses, and MOOCS.
- The program consists of discipline specific electives, comprising wide range of courses from the disciplines catering to the present industry requirement.
- In Semester II and III, 1 multi-disciplinary elective offered by other departments will be selected by the students.
- Students need to complete 1 MOOCS Course in each I, II and III Semester.
- Students will undergo for 2 months summer internship after II semester and submit internship in III semester.
- In semester IV students will undergo for 6 months Project Work.

Semester and Course wise credit

Semester	Discipline Specific Core (DSC) (L+T+P)	Discipline Elective (DSE) / Elective (EL)	Project Work Dissertation	Common Compulsory Course (CCC)	Inter-Disciplinary Elective	Internship	Lab	Total Credits
I	DSC 1 (4) DSC 2 (4) DSC 3 (4) DSC 4 (4) Add-on/AEC (2)	MOOC/Swayam Elective-I (4)	-				Computer Programming Lab1-1 (1) Space Instrumentation Lab-2(1)	**24**
II	DSC 5 (4) DSC 6 (4) DSC 7(4)	MOOC/Swayam /Elective-1I (3) Elective-III (4)	-	CCC -2 Introduction to AI (4)	IDE 1 (3) online/offline	Internship (2)	Atmospheric Science Lab-3 (1) Remote Sensing Lab-4 (1)	**30**
III	DSC 9(4) DSC 10(4)	MOOC/Swayam/Elective- IV(3) Elective-V (4)	Thesis Phase-1 (2) Seminar-1 (1)	CCC-1 Building Mathematical Ability (4)	IDE 2 (3) online/offline		Lab-5 (1) Computer Programming for Space Science Lab-6 (1)	**27**
IV	-	-	Dissertation (16)				-	**16**
Total	**38**	**18**	**19**	**8**	**6**	**2**	**6**	**97**
Percentage	**39.17**	**18.55**	**19.58**	**8.24**	**6.18**	**2.10**	**6.18**	**100**

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

Programme Structure with course titles

S. No	Course Code	Title of the Course	Credits	Credit Distribution		
				L	T/L	P/S
Semester – I						
1.	MST101	Introduction to Space Sciences And Applications	4	3	1	0
2.	MST102	Techniques Of Space Instrumentation	4	3	1	0
3.	MST103	Basics Of Astrodynamics	4	3	1	0
4.	MST104	Mathematical Methods & Computational Techniques	4	3	1	0
5.	MST105	Machine Learning & Artificial Intelligence Mooc/Online/Elective-I	4	4	0	0
6.	MST106	Add-on	2	0	0	2
7.	MST107-L	Computer Programming Lab1-1	1	0	0	1
8.	MST108-L	Space Instrumentation Lab2-1	1	0	0	1
Total			**24**	**16**	**4**	**4**
Semester – II						
1.	MST201	Introduction To Atmospheric Science	4	3	1	0
2.	MST202	Remote Sensing And Applications	4	3	1	0
3.	MST203	Spacecraft Guidance And Navigation	4	3	1	0
4.	MST204	MOOC/ Online/ Elective II	3	3	0	0
	Any one of the following electives: (**Elective-III)** (Any one from 5A to 5E)					
5A	MST211	Special Theory Of Relativity	4	3	1	0
5B	MST212	Principles of Fluid Dynamics				
5C	MST213	Internet Of Things				
5D	MST214	Techniques of Astronomical Observations				
5E	MST215	Remotely Sensed Digital Image Processing and Analysis				
6.	MST216	CCC -2 I Artificial Intelligence & Machine Learning	4	2	0	2
7.	MST217	IDE 1	3	3	0	0
8.	MST218-L	Atmospheric Science Lab-3	1	0	0	1
9.	MST219-L	Remote Sensing Lab-4	1	0	0	1
10.		Internship	2	0	0	2
		Total	**30**	**20**	**4**	**6**

S. No	Course Code	Title of the Course	Credits	Credit Distribution		
				L	T/L	P/S
Semester – III						
1.	MST301	Climate Change In Arid Lands	4	3	1	0
2.	MST302	Concepts Of Astronomy And Astrophysics	4	3	1	0
3.	MST303	MOOC / Online/ Elective –**IV**)	3	3	0	0
4	MST304	Building Mathematical Ability	4	4	0	0
	Any one of the following electives: **Elective- V** (Any one from 5A to 5E)		4	3	1	0
5A.	MST311	Theory and Observations of Stars				
5B.	MST312	General Circulation And Monsoon				
5C.	MST313	Big Data Analytics				
5D.	MST314	Spatial Statistics				
5E.	MST315	Aerodynamics				
6.	MST316-L	Lab: Elective(to choose one from elective 5 Institute elective	1	0	0	1
7.	MST317-L	Computer Programming for Space Science Lab-6	1	0	0	1
8.	MST318	IDE 2	3	3	0	0
9.		Thesis Phase-1	2	0	0	2
10.		Seminar-1	1	0	0	1
Total			**27**	**19**	**3**	**5**
Semester – IV						
1.	MST401	Dissertation	16	0	0	16
Total			**16**	**0**	**0**	**16**

L – Lectures **T/L – Tutorials/Lab** **S/P– Seminar/Practical**

Note 1: Project Dissertation Phase-I shall be identified and students have to Compulsorily make a presentation at the end of III Semester.

Note 2: One more MOOC course can be done by student to score additional credits. Any course that taken by student can be approved by the competent authority of the University.

Semester-Wise Credit Distribution

Semester	Total Credits	Cumulative credit at the end of the semester
I	24	24
II	30	54
III	27	81
IV	16	97

Important Information to Students

1. Eligibility: With at least 50% marks in the Bachelor's degree with Mathematics and Physics as compulsory subjects or B.E/B.Tech in any Branch with 50% aggregate.

2. The minimum duration for completion of any PG Program 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.

3. A student should attend at least 75% of the classes, seminars, practical / lab in each course of study.

4. All theory courses in the programme carry aContinuous Internal Assessment (CIA) component of 40 marks and Semester-end component for 60 marks. The minimum pass marks for a course are 40%.

   In case of courses with lab component Continuous Internal Assessment (CIA) component shall be of 60 marks and Semester-end component for 40 marks. The minimum pass marks for a course are 40%.

5. The student is given 3 Continuous Internal Assessment (CIA) tests per semester in each course from which the best 2 performances are considered for the purpose of calculating the marks in CIA. A record of the continuous assessment is maintained by the academic unit. The 3 internal tests are conducted for 15 Marks each, out of the best 2 tests scores are considered for 30 marks. Out of the remaining 10 marks, 5 marks are awarded for assignments, class presentations and class participation of the students and the remaining 5 marks are awarded for punctuality, and attendance of the student.

   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

6. A student should pass separately in both CIA and the ESE, i.e., a 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 (ESE).
7. Semester-end examination shall consist of Objective type questions, descriptive type questions, short answer questions and case studies or any other recommended by the BOS.
8. 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.
9. Students failing a course due to lack of attendance should redo the course.
10. Re-evaluation is applicable only for theory papers and shall not be entertained for other components such as practical/ thesis/ dissertation/ internship etc.
11. An on- campus elective course is offered only if a minimum of ten or 40% of the students registered, whichever is higher.