Annexure-I

Department: Department of Atmospheric & Space Sciences

Course: M.Tech. (Atmospheric Science) Duration: 2 Years

Semester I		
Core Courses: 20 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-01-T	Mathematical and Statistical Methods	2
ATM-02-T	Atmospheric Thermodynamics and Radiation	4
ATM-03-T	Introductory Atmospheric Science	4
ATM-04-T	Atmospheric Dynamics-I	4
ATM-05-T	Introductory Earth Science	2
ATM-20-L	Laboratory Course I	4
Elective Courses:		
Subject Code	**Subject Title**	**Number of Credits**
N/A	N/A	

Total Number of Credits: 20 Credits

Semester II		
Core Courses: 16 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-06-T	Atmospheric Dynamics- II	4
ATM-07-T	Physical and Dynamic Oceanography	2
ATM-08-T	Numerical Weather Prediction & Parametrization	4
ATM-09-T	Space Weather	2
ATM-21-L	Laboratory Course-II	4
Elective Courses: 4 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-10-T	Cloud Physics & Atmospheric Electricity	4
ATM-12-T	Atmospheric General Circulation	2
ATM-13-T	Atmospheric Instrumentation	4
ATM-26-S	World Weather Reporting	2
ATM-22-L	R programming	4
ATM-27-L	Python programming	4

Total Number of Credits: 20 Credits

Semester III		
Core Courses: 4 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-14-T	Climate Physics and Modelling	4
Elective Courses: 16 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-11-T	Agrometeorology	4
ATM-23-L	Laboratory Course- Mesoscale Modelling	4
ATM-15-T	Atmospheric Chemistry and Air Pollution	4
ATM-16-T	Middle Atmosphere	4
ATM-17-T	Satellite Technology and Radar Meteorology	4
ATM-18-T	Introduction to Climate Services	2
ATM-19-T	Ocean Biology and Biogeochemistry	2
ATM-24-P	Internship Training	4

Semester IV		
Core Courses: 20 Credits		
Subject Code	**Subject Title**	**Number of Credits**
ATM-25-P	Project	20
Elective Courses		
Subject Code	**Subject Title**	**Number of Credits**
N/A	N/A	

UGC recommended courses(Additional 10 credits)		
Subject Code	**Subject Title**	**Number of Credits**
	Cyber security/Information security	4
	Skill based credits	4
	Human rights education	2

Courses which can be opted for by students from outside departments.

Semester -------		
Core Courses		
Subject Code	**Subject Title**	**Number of Credits**
ATM-04-T	Atmospheric Dynamics-I	4
ATM-07-T	Physical and Dynamic Oceanography	2
ATM-09-T	Space Weather	2
Elective Courses		
Subject Code	**Subject Title**	**Number of Credits**
ATM-18-T	Introduction to Climate Services	2
ATM-16-T	Middle Atmosphere	4
ATM-13-T	Atmospheric Instrumentation	4

Annexure-II

Subject Code: ATM-22-L

Subject Name: R- Programming

[4 credits]

An overview of R, R data types and objects, Reading and Writing in different types of file formats, Vectors, factors and univariate time series, Data frames and matrices, Functions, operators and loops, Graphics in R, Styles of Data analysis, Statistical Models, Applications of Numerical, Scientific and plotting., Simulation, code profiling

Books:

Zuur A., Ieno E., Meesters E. A beginner's guide to R , Springer, 2009

Subject Code: ATM-27- L

Subject Name: Python Programming

[4 credits]

Python-Introduction, Python Interpreter, Argument Passing, Data types: Numbers, Strings, Unicode Strings, Lists; Flow Control: If Statements, for Statements, Range function, pass, break and continue statements, Loops Functions:-Default Argument Values, Keyword Arguments, Arbitrary Argument Lists, Unpacking Argument Lists, Lambda Forms, Documentation Strings. Python Data Structures, Using Lists as Stacks and Queues, del statement, Tuples and Sequences, Sets, Dictionaries, Comparing Sequences and Other Types, Data Modules: Executing modules as scripts, The Module Search Path, Compiled Python files, Standard Modules, dir Function, Packages: Importing From a Package, Intra-package References, Packages in Multiple Directories Python Input Output-Fancier Output Formatting, Old string formatting, Reading and Writing Files, Methods of File Objects, The pickle Module, Errors and Exceptions: Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Action Applications of Numerical Python, Scientific Python and Mat plot lib

Books:

1. A Primer on Scientific Programming with Python (First Edition), Hans PetterLangtangen, Springer, 2009

2. Head first programming: a learner's guide to programming using the python language, David Griffiths

3. Python Programming: An Introduction to Computer Science, John M. Zelle

4. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython, Wes Mckinney