CAOS-CEaS Joint M.Tech. programme

Earth and Climate Science

Background

- The present M.Tech. courses at CAOS and CeAS are losing popularity

- Recommendation from review committee for a joint programme

Goal

To offer an M. Tech. that is attractive to both industry and research.

M. Tech. in Earth and Climate Science

Specialisations

- Earth System Modeling
- Data Science for Earth and Climate science (computations, AI & ML)
- Forecasting
- Theory (dynamics)
- Experiments and observations

Private forecasters smell big bucks in Indian weather

Earth System Modeling

Numerical Models of Earth, Ocean, Atmosphere

GCM, Simple models

Data Science for Earth & Climate

- Data analysis methods
- AL & ML (draw from CDS)
- Computational Science (draw from CDS, SERC)

CAOS-CEAS Joint M. Tech. in Earth & Climate Science

Interdisciplinary Programme designed to understand Earth system interactions at a range of space and time scales using a combination of theoretical , numerical, experimental and data science approaches

Intake: 30   Launch: 2023 August

Qualification with required GATE paper (in brackets) :

B.E. / B. Tech. or equivalent degree in any discipline & GATE Paper in :

Aerospace (AE) , Civil (CE), Chemical (CH), ECE (EC), Electrical (EE),

Mechanical (ME),   Engg. Sci. (XE), Computer Sci. & IT (CS))

OR

M. Sc. or equivalent degree in any discipline and GATE Paper in:

Chemistry (CY),   Geology & Geophy (GG), Maths (MA), Physics PH.

Selection Process: Based on 70% of GATE score + 30% interview

Proposed partitioning of the 30 students as per their Bachelor's Major/GATE Paper

ME/ AE/CE/MA/PH/EC/EE/CS/XE	GG/CY/CH
20	10

Areas of study

Solid Earth Processes, Geodymanics, Petrology, Seismic Hazards, Geodesy, Atmospheric, Oceanic and Geophysical Fluid Dynamics, Physical and Chemical oceanography, Thermodynamics, Clouds, Radiation, Numerical Modelling of Atmosphere, Ocean & Climate, Paleoclimate Studies, Satellite Meteorology, Data Analysis, Nonlinear Climate Dynamics, Geochemical Cycles, Observation and Mass Spectrometry Techniques

Structure

Total Credits:	**64**
Core Courses:	**24 Credits**
	Includes two 0:3 courses. One each in sem. 2 & 3
Elective Courses:	**21 Credits**
Writing & Seminar:	**2 Credits**
Summer Internship:	**2 Credits**

With an option for research in IISc or training in industry (2 Months).

IISc mentor is required.

Progress to be monitored by the mentor and co-guide (if any) every fortnight.

Project to be evaluated and grade to be given by a committee consisting of mentor co-advisor and one faculty member.

Project (4th semester):   15 Credits

With an option for project in industry

Progress to be monitored by the mentor and co-guide (if any) every fortnight.

Evaluataion as per the existing M. Tech. course.

Semester I: 5 Core courses Only ➔15
Semester II: 3 Core courses and 2 Electives ➔ 15
Semester III: 5 Elective courses ➔ 15
Semester IV: 15 Credits of Project work ➔ 15
Writing & Seminar: 2 Credit (In semester 4)
Summer internship: 2 Credits

Core Courses Basket

Required: 3 Credits
   Mathematics for Earth scientists (Binod)
   /Mathematical Methods in climate science (Venu)
    /An equivalent course from IISc as approved by the
   mentor & chairman.

Required: 6 Credits
   Lab course Earth science lab (0:3)) [3 credits]
   (Prosenjit) &
   Lab course Observational Techniques (2:1) (Bhat) [3
   credits]

Required: 15 Credits (at least two course from each
group A&B):

Group A
Atmospheric Dynamics, 3:0 (Ravi/Jai)
Physical Oceanography, 2:1 (Vinay/Bisakh)
Intro to Climate System, 3:0 (Bala)
Atmospheric Thermodynamics (Arindam) 3:0
Atmos. Radiation (SKS) 3:0

Group B
Origin and Evolution of the Earth (Ramananada) 3:0
Intro to Earth Systems (Prosenjit): 2:1
Introduction to Seismology (Pawan) 3:0
Solid Earth Geophysics (Attreyee Ghosh) 3:0

All The Courses

August Semester

Core Courses

Atmospheric Dynamics 3:0 (Ravi/Jai)
Atmos. Radiation & Climate (SKS) 3:0
Origin and Evolution of the Earth (Ramananda) 3:0
Atmospheric Thermodynamics (Arindam) 3:0
Intro to Earth Systems (Prosenjit): 2:1
Solid Earth Geophysics (Attreyee) 3:0
Mathematics for Earth scientists (Binod) 3:0
Lab course Earth science (0:3)) [3 credits] (Prosenjit)

Elective Courses

Environmental Fluid Mechanics (Bishakh) 3:0
Ocean Modeling (Vinay) 2:1
Satellite Meteorology (SKS) 3:0
Geophysical Data Analysis and Inversion (Pawan) 3:0
Biogeochemistry (Prosenjith), 3:0
Nonlinear Models in Climate Science (Ashwin) 3:0

January Semester

Core Courses

Physical Oceanography 2:1 (Vinay/Bisakh)
Introduction to Seismology (Pawan) 3:0
Introduction to Climate System (Bala) 3:0
Mathematical Methods in climate science (Venu) 3:0
Lab course: Observational Techniques (Bhat/SKS) 2:1

Elective Courses

Geophysical Fluid Dynamics (Jai) 3:0
Numerical Methods (Ashwin/Ravi) 3:0
Inverse Problems in Geophysics 3:0 (Pawan)
Dynamics of Planetary Interiors (Binod)
Introduction to Satellite Geodesy (Brahma) 3:0
Introduction to Petrology (Sajeev) 3:0
Introduction to Chem. Oceanography (Sambudha)
Modelling & Forecasting, 2:1 (Pawan, Ravi, Arindam, Vinay)