

TIME SLOT DISTRIBUTION

	0930-1030	1030-1130	1130-1230	1400-1500	1530-1630
MONDAY	1A	2A	3A	4A	5A
TUESDAY	2B	3B	6A	7A	8A
WEDNESDAY	1B	4B	3C	8B	6B
THURSDAY	4C	5B	7B	6C	SEMINAR
FRIDAY	1C	6D	5C	7C	8C

TIME TABLE FOR COURSES

COURSE No.	COURSE TITLE	INSTRUCTOR	SLOT	VENUE
MIS(CMMACS)-401	Advanced Self Study (Core)	PhD Guide		
MIS(CMMACS)-101	Research Methodology (Core)	PG	2	CCR 1
MIS(CMMACS)-205	Reasoning and Quantitative Thinking (Elective)	VKG	3	CCR 1
MIS(CMMACS)-301	Weather and Climate Informatics (Elective)	KVR	7	CCR 1
ENG(CMMACS)-201	Transport Phenomena (Elective)	PSG	4	CCR 1

ACADEMIC CALENDAR (January 2012 session)

Last Date for Submission of Course Registration Forms	6th Jan 2012
Instruction Begins	9th Jan 2012
Last Date for ADD/DROP courses	16th Jan 2012
Mid-Semester Examinations	5-9 March 2012
Instruction ends	20 April 2012
End-Semester Examinations	23-27 April 2012
Last Date for Submission of Grades	4th May 2012

VKG – Prof V K Gaur
PG – Dr P Goswami
KVR – Dr K V Ramesh
PSG – Dr P S Goswami

(a) MIS(CMMACS)- 301:0-2-4-4: Advanced Self Study

Aims to train the student on learning, on one's own, topics that are not formally taught in a course. This would involve primarily three components - collection of relevant literature on a chosen topic, organization of relevant material into a written report based on candidate's own critical understanding and finally presentation of the findings in front of wide audience in the form of a seminar. Thus communication skills are also expected to be honed up (4 credits)

Course Coordinator: PhD Guide

(b) MIS(CMMACS)- 101:1-1-0-2: Research Methodology

Course description: Introduction, Research terminology and scientific methods, different types and styles of research, role of serendipity, creativity and innovation, Scientific and critical reasoning skills, art of reading and understanding scientific papers, literature survey. Measurements in research - primary and secondary data. Quantitative methods and data analysis, Qualitative analysis, Communicating research results. Designing and implementing a research project. Ethics in research, Plagiarism, Case studies. Laboratory safety issues – lab, workshop, electrical, health & fire safety, safe disposal of hazardous materials.

Role & importance of communication, Effective oral and written communication. Technical report writing, Technical/R&D proposals, Research paper writing, Dissertation/Thesis writing, Letter writing and official correspondence. Oral communication in meetings, seminars, group discussions; Use of modern aids; Making technical presentations.

Course Coordinator: Dr P Goswami

MIS(CMMACS)-205	Reasoning and Quantitative Thinking Coordinator - Prof. V K Gaur	2-1-0-3
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Reasoning¹-Philosophy²-Science³: the eternal cycle towards framing significant questions and validating knowledge through examples⁴

Analysis of valid and invalid reasoning through examples such as syllogism⁵
Enquiry in the method (?) of establishing knowledge(science) through analysis of Aristotle's Inductive-deductive schema and its continual refinement through the ages to Popper's falsification criteria.

An understanding of the validity and value of Induction through analysis of Mathematical Induction and exploration of 'inductive processes' discernible in the road to some key scientific discoveries

An exploration of the development chain of some key concepts such as the definition of a 'number'- from Peano to Frege - as an example of relentless march towards bridging the

chasm between consistency and completeness. Self study to look for and explain other examples⁶

Symbolic Logic: its journey from Leibnitz's prescient programme through a long refinement by Frege, Cantor, Turing and others

The explosive illumination of science coupled to mathematics: quantitative verification, prediction, engineering and systems design, algorithmic explorations.

MIS (CMMACS) -301	Weather and Climate Informatics Coordinator - Dr K V Ramesh	2-1-0-3
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Earth system overview: Introduction to geography and natural resources, Overview of fundamentals of Earth's climate, including greenhouse effect, water and chemical cycles, outstanding features of atmospheric and ocean circulation, and feedback between different system components. Exciting and contentious scientific puzzles of climate system, like causes of ice ages, greenhouse warming, IOD, El niño etc.

Weather and climate: Introduction, Atmosphere: Composition & Structure, Earth-sun geometry, Energy and Energy Transfer, Radiation, Energy Balance, Temperature, Atmospheric Moisture, Atmospheric stability, Clouds & Precipitation, Forces and Winds, Wind Systems, Weather Systems, Severe storage. Basics of thermodynamics and dynamics, Atmospheric and oceanic approximations.

Observation, analysis, modelling, forecasting and validation: Statistical analysis in climate research: probability theory, Distribution of climate variables, concepts of statistical interference, statistical test of hypothesis, analysis of atmospheric circulation problems, Forecast quality evaluation.

Application of weather informatics: Real time flood forecasting, land slide prediction, forest fire, precision agriculture: planting and fertilizer application, demand for electricity and gas, aviation etc.

Climate Change and Climate Modeling: Global environmental issues in climate change due to human activities or natural climate variations. Climate and environmental change, understand how physical geography techniques can help quantify and understand these changes, learn how to work with climate data and simple models, analyze the potential impacts of environmental change on a range of sectors including agriculture, food, forestry, water resources, energy usage, rapid change caused by natural hazard processes and human health, and discuss potential mitigation and adaptation options.

Software Lab: Introduction to basic data analysis tools. Survey of numerical methods employed in atmospheric and related sciences: theory, application, and programming.

Recommended Books

1. Environmental Issues: An Introduction to Sustainability, 3/E by Robert L. McConnell and Daniel C. Abel
2. Carson, R. (2002). *Silent Spring*, Boston: Houghton Mifflin Company.
3. Harris, J.M. (2006). *Environmental and Natural Resource Economics*, 2nd edition, Boston: Houghton Mifflin.
4. Meadows, D.H. et al., (2004). *The Limits to Growth: the 30-year Update*, The Chelsea Green Publishing Company.
5. Perman, R., May, Y., McGilvray, J. and Common, M. (2003). *Natural Resource and Environmental Economics*, 3rd edition, Harlow: Pearson Education.
6. Statistical analysis in climate research By Hans von Storch, Francis W. Zwiers.