



Digital Elevation Models and Applications

Civil Engineering

Instructor Name: Dr. Arun K. Saraf

Institute: IIT Roorkee

Department: Others

About Instructor: Dr. Arun K. Saraf is Ph. D. (Remote Sensing) from University of Dundee, United Kingdom. Presently he is working as Professor in the Department of Earth Sciences, Indian Institute of Technology, Roorkee, and teaches courses on Geographic Information Systems (GIS), Advanced GIS, Remote Sensing, Geomorphology etc. to under- and post-graduate students of Geological Technology and Applied Geology. He was also Head of Department of Earth Sciences between Jan. 2012 – Feb. 2015. He was first in the country to introduce GIS course to post-graduate students in the year 1990. In 1986, he was awarded “National Fellowship to Study Abroad” by Govt. of India for his doctoral degree. Further, in 1993 he was awarded “Indo-US S&T Fellowship” and worked in Goddard Space Flight Centre, NASA, USA for Post Doctoral Research. He has been also awarded “National Remote Sensing Award-2001” by Indian Society of Remote Sensing and “GIS Professional of the Year Award-2001” by Map India 2002 for his outstanding research contributions in the fields of Remote Sensing and GIS. Earlier, he has also been given several Khosla Research Awards and Prizes by then University of Roorkee. So far Prof. Saraf has published more than 100 research papers in journals of repute (ISI) and supervised 11 Ph.Ds. He was also Associate Editor of International Journal of Remote Sensing during 2003-2015. Through funding from DST, Min. of Earth Sciences, CSIR, Prof. Saraf has been able to establish and operating NOAA-HRPT Satellite Earth Station at IITR since Oct. 2002, first in any educational institute in the country. This Earth Station is still operational and acquiring data from NOAA-18 & 19 day-and-night. Further, recently Prof. Saraf have also recorded three NPTEL video courses on Introduction to Geographic Information Systems, Introduction to Remote Sensing and Digital Image Processing of Remote Sensing Data.

Pre Requisites: : Current students of engineering, post graduate science students and PhD students should have basic knowledge of GIS

Core/Elective: : Elective

UG/PG: : Both

Industry Support : Geoinformatics companies, e.g NIIT, ESRI India, Leica Geoinformatics, MapmyIndia, ISRO, etc.

Course Intro: : The proposed course provides basic understanding about digital elevation models (DEMs) and their applications in Civil Engineering and Earth Sciences. Further, in the proposed course various DEMs, their source, generation techniques, derivatives, errors and limitations would be discussed extensively. Surface Hydrologic Modelling using DEMs, modelling derivatives and their applications would also be discussed.

COURSE PLAN

SL.NO	Week	Module Name
1	1	Concept of digital elevation model (DEM) and how it is represented? Various techniques to generate digital elevation models-1 Various techniques to generate digital elevation models-2 Various techniques to generate digital elevation models-3 Importance of spatial resolution with DEMs



2	2	<p>How to assess quality of a DEM? Integration of DEMs with satellite data Common derivatives of DEMs - Slope and aspect Triangulated Irregular Network (TIN) and its derivatives Shaded relief models and their applications</p>
3	3	<p>DEMs derivatives – 1 DEMs derivatives – 2 DEMs derivatives – 3 DEMs derivatives – 4 DEM based Surface Hydrologic Modelling-1</p>
4	4	<p>DEMs based Surface Hydrologic Modelling-2 DEMs and dam simulation and its application in groundwater hydrology Applications of DEMs in solar and wind energy potential estimations Applications of DEMs in Viewshed and Flood Hazard Mapping DEMs Sources, limitations and future of Digital Elevation Models</p>