GLOBAL NAVIGATION SATELLITE SYSTEMS AND APPLICATIONS

PROF. ARUN K. SARAF

Department of Earth Sciences

IIT Roorkee

INTENDED AUDIENCE: Under and post-graduate engineering and post graduate science students/Faculty

PRE-REQUISITES: Current students of engineering, post graduate science students and PhD students should have basic knowledge of GIS and Remote Sensing

INDUSTRY SUPPORT: Geoinformatics companies, e.g NIIT, ESRI India, Leica Geoinformatics, MapmyIndia, ISRO, etc.

COURSE OUTLINE :

The proposed course provides basic understanding about digital elevation models (DEMs) and their applications in Civil Engineering and Earth Sciences. Further,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.

ABOUT INSTRUCTOR :

Prof. 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 Remote Sensing, Digital Image Processing, Geographic Information Systems (GIS), Advanced GIS, Geomorphology, Geohydrology 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. In recent past, Prof. Saraf has also recorded four courses viz. Introduction to Geographic Information Systems, Introduction to Remote Sensing, Digital Image Processing of Satellite Data, Digital Elevation Models and Applications and Global Navigation Satellite Systems under the NPTEL scheme.

COURSE PLAN :

WEEK-1: Introduction to Global Navigation Satellite System (GNSS)
How position is determined by the GNSS? (Part-I)
How position is determined by the GNSS? (Part-II)
How position is determined by the GNSS? (Part-III)
NAVSTAR - Global Positioning System

WEEK-2: Global Navigation Satellite System (GLONASS)
BeiDou Navigation Satellite System (BDS)
Indian Regional Navigation Satellite System (IRNSS)
GALILEO
Quasi-Zenith Satellite System (QZSS)

WEEK-3: Differential Global Navigation Satellite System (DGNSS)
REAL-TIME KINEMATIC (RTK)
Satellite Based Augmentation System (SBAS)
GNSS Errors
GNSS Correction Methods

WEEK-4: Why altitude estimated by GNSS receivers is not very accurate
Global Navigation Satellite Systems (GNSS) Applications - I
Global Navigation Satellite Systems (GNSS) Applications - II
GNSS: Current Trends and Future
GNSS: Opportunities in India