INTRODUCTION TO UNCERTAINTY ANALYSIS AND EXPERIMENTATION

PROF. S. R. KALE

Department of Mechanical Engineering

IIT Delhi

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 8 Weeks (24 Jan' 22 - 18 Mar' 22)

EXAM DATE : 27 Mar 2022

PRE-REQUISITES : This course is aimed at 3rd/4th year undergraduates, masters, and PhD students, and at professionals with at least a bachelors degree in engineering or science.

INTENDED AUDIENCE : UG, PG and PhD level engineering students; Engineering faculty; Professionals in industry and R & D laboratories

INDUSTRIES APPLICABLE TO : Topics in this course are relevant to many industries, especially MSMEs as it will enhance quality and adherence to standards.

COURSE OUTLINE :

I will address fundamental topics on uncertainty analysis and their applications and give an overview of experimentation. Practicing engineers, researchers, and engineering students at UG, PG and PhD, from many disciplines will benefit from this course. The topics include experimentation process, errors in measurement, uncertainty in a measurement and in the result, uncertainty propagations, pre- and post- test uncertainty analysis, uncertainty analysis for design of set-up, and regression and correlation. The methodology will follow ASME Performance Test Code, and ISO Guide to the expression of Uncertainty in Measurement. I will discuss a variety of practical applications and use of national and international standards related to engineering and research and their relevance in education.

ABOUT INSTRUCTOR :

Prof. Sunil R. Kale has been with the Department of Mechanical Engineering since 1989. He has developed and taught UG courses (thermodynamics, energy conversion, heat and mass transfer, power plant technologies, engineering drawing, and mechanical core laboratory), and PG courses (experimental methods for thermal engineering, multiphase flows). His research, academic and industry-related, is in the fields of heat transfer, fluid mechanics, fire dynamics, combustion, and energy conversion.

COURSE PLAN :

 Week 1**:** Introduction

 Week 2**:** Error, Uncertainty

 Week 3**:** Experimentation

 Week 4**:** Uncertianty In A Measurment-I (Fundamentals)

 Week 5**:** Uncertianty In A Measurment-II (Special Cases)

 Week 6**:** Uncertianty In A Result-I (Fundamentals)

 Week 7**:** Uncertianty In A Result-II (Special Cases)

 Week 8**:** Data Analysis And Reporting