PROF. JITENDRA KUMAR
Department of Mathematics
IIT Kharagpur

PROF. SOMESH KUMAR
Department of Mathematics
IIT Kharagpur

PRE-REQUISITES : Higher Secondary

INTENDED AUDIENCE : All branches of science and engineering

COURSE OUTLINE :

This course is about basic mathematics, which is a fundamental and essential component of all undergraduate studies in sciences and engineering. This course consists of topics in differential, integral, and vector calculus with applications to various engineering problems. This course will cover calculus of two or more variables in detail. Knowledge of ordinary differential equations are part of this course. Students will learn how to perform double and triple integrals. Topic in vector calculus includesline and surface integrals, Green, Gauss and Stokes theorem.

ABOUT INSTRUCTOR :

Prof. Jitendra Kumar is a Professor at the Department of Mathematics, IIT Kharagpur. He completed his M.Sc. in Industrial Mathematics from IIT Roorkee and then from Technical University of Kaiserslautern, Germany. He was awarded a doctorate in 2006 from Otto-von-Guericke University Magdeburg, Germany. After completing his Ph.D., he was offered a lectureship at the Institute for Analysis and Numerical Mathematics, Otto-von-Guericke University Magdeburg, Germany. Dr. Kumar is the recipient of several recognized awards and fellowships, including the Alexander von Humboldt fellowship, DAAD & DGF scholarships. His research interests include Numerical solutions of integro-differential equations, numerical analysis and modelling and simulations of problems in particulate systems.

Prof. Somesh Kumar is a professor in the Department of Mathematics, IIT Kharagpur. He has over 32 years of experience of teaching courses on Probability Statistics, Statistical Inference, Sampling Theory, Stochastic Processes, Multivariate Analysis, Regression Analysis, Time Series, Experimental Designs, Decision Theory to undergraduate, postgraduate and doctorate students. His NPTEL courses (under MHRD) on Probability and Statistics, Statistical Inference and Statistical Methods for Scientists and Engineers (each of 40 hours) are available online and very popular. He has also taught Mathematics-I in QEEE program of MHRD to 130 engineering college students in online mode during Autumn 2014-2015. He offered the course "Probability and Statistics" for certification program in Jan-April 2016, Jan-April 2017, Jan-April 2019. He also offered the course "Statistical Inference" for certification program during Jan-April 2019. His lectures on "Probability" and "Permutation and combinations" for class XII students under IIT-PAL scheme of MHRD are also available through DTH channels of national television. His research interests are Statistical Decision Theory, Estimation Theory, Testing of Hypothesis, Classification Problems, Directional Distributions, Limit Theorems. He has published more than 100 research papers in refereed reputed international journals and book chapters. He has supervised eleven Ph.D. students and more than two hundred fifty Masters (M.Tech./ M.Sc./B.Tech.) dissertations. He has been guest professor in University of Ulm, Germany in July 2017 and June-July 2018 and in University of Dortmund in May-June 2019. He is Principal Investigator for a major research project "Drone for Vaccine Delivery" funded by the Indian Council for Medical Research. He has delivered invited lectures in various universities in India and abroad.

COURSE PLAN :
Week 1: Differential calculus of one variable
Week 2: Limit, continuity, partial derivatives of functions of two or more variables
Week 3: Differentiability of functions of two or more variables
Week 4: Differentiation of Homogeneous and Implicit Functions, Taylors theorem of functions of two variables
Week 5: Maxima and Minima
Week 6: First order ODEs
Week 7: Higher order ODEs
Week 8: Improper integrals
Week 9: Double integrals
Week 10: Triple Integrals
Week 11: Vector and scalar field, gradient, divergence and curl
Week 12: Line and surface integrals. Green, Stokes and Gauss divergence theorems