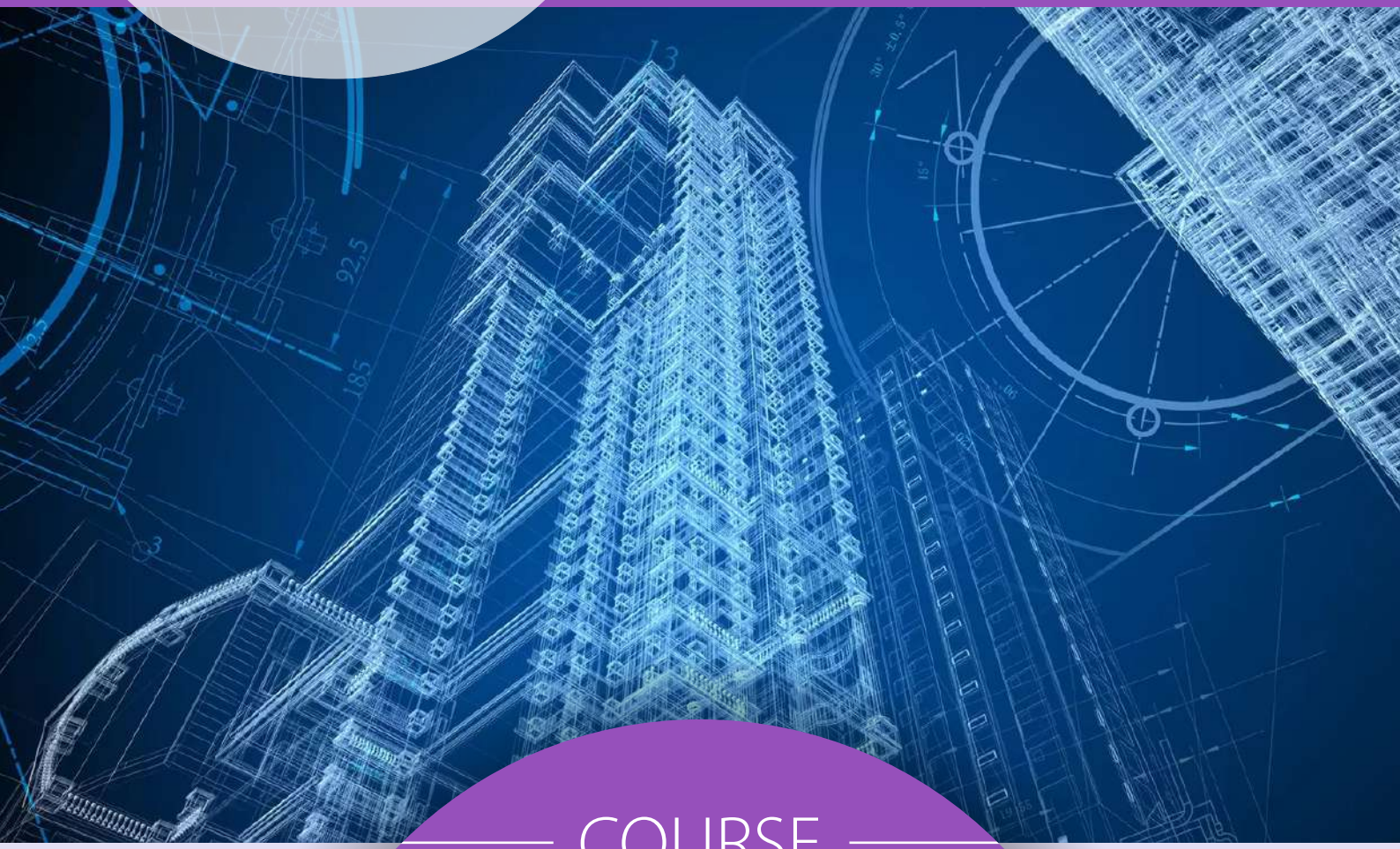
SHARDA UNIVERSITY
Beyond Boundaries

NAAC A+ ACCREDITED

SHARDA SCHOOL OF
BASIC SCIENCES
& RESEARCH



COURSE

Basics of System Modeling and Simulation (VAS805)

VALUE ADDED
COURSE BROCHURE-30 HRS
2024-25

ABOUT THE UNIVERSITY

Sharda University envisions to serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship. It has 14,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is NAAC A+ University with Overall NIRF Rank of 87. Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to impact significantly on student learning and therefore teachers must refine their conceptual and pedagogical skills.

ABOUT SCHOOL

Sharda School of Basic Sciences and Research (SSBSR) boasts of providing an interdisciplinary approach, exposure to different disciplines in science including Chemistry,Bio-Chemistry, Physics, Mathematics, Life Sciences, and Environmental Sciences.

The Sharda School of Basic Sciences and Research is unique from other institutions of higher learning as it is committed to imparting knowledge in pure and applied sciences, which not only forms the foundation for further academic pursuits in science and technology but also acts as the foundation for students to pursue a career in multi facet directions.

The academic programs are designed to meet the requirement of the latest technological developments and envisages to become a state-of-the-art department that cater the students at Graduate, Post-Graduate and Research level along with providing high-quality education and cutting-edge interdisciplinary research in sciences. SSBSR has well-equipped laboratories for Physics, MATLAB, Microbiology, Molecular Biology, Cell Culture, Virology, Bio-Chemistry, Physical, Organic and Inorganic chemistry for Graduate and Post-Graduate Programs. In addition, there are Central Instrumentation Facility (CIF) and other advance research labs to promote research culture.

ABOUT COURSE

The objective of this course is to provide a basic treatment of all the important aspects of modeling and simulation. A simulation is a model that mimics the operation of an existing or proposed system, providing evidence for decision-making by being able to test different scenarios or process changes. Simulation is a powerful technique for solving the wide variety of problems.

COURSE SCHEDULE

Week	Content
1.	Introduction to System Modeling and Simulation
2.	Probability & Random Number Generation
3.	System Modeling Concepts
4.	Queuing Systems & Discrete System Simulation
5.	Real World Application of Simulation

RESOURCE PERSONS

Dr. Shahid Baboo

Department of Mathematics, Sharda University

A committed and capable Research Fellow with overall 19 years of experience in teaching. Extensively published in theoretical work, with significant expertise in Differential and Integral Calculus and Complex Analysis also capable of handling of examinations. He is much more interested in teaching and learning.

Dr. Anshu Kumar

Department of Mathematics, Sharda University

Dr. Anshu Kumar have joined Sharda group of institutions in 2007. At present, he is working as an Assistant Professor in the department of mathematics in the School of basic sciences and Research of Sharda University. He have done Ph.D. from Motilal Nehru National Institute of Technology.

School: SSBSR **Programme: PG.** **Branch: M.Sc. Mathematics, M.Sc. Data Science & Analytics**	**Batch : 2023-2024** **Current Academic Year: 2024-2025** **Semester : III**

1. Course Code	VAS805
2. Course Title	Basics of System Modeling and Simulation
3. Credits	Audit Course
4. Contact Hours (L-T-P)	30 Hours
Course Type	Value added course
5. Course Objective	1.To introduce the fundamental concepts of system modeling and Simulation. 2.To understand the mathematical foundations of system model. 3.To explore the principles and methods of simulation.
6. Course Outcomes	CO1: The student will be able to understand the basic concepts of system and model. CO2: The student will be able to explain the basics of probability and random number generation. CO3: The student will be able to explain the concept of validation and verification. CO4: The student will be able to develop model of arrival process CO5: The student will be able to apply the concept of discrete and continuous system simulation. CO6: The student will be able to find various real world application of simulation.
7. Course Description	This is an introductory course that provides an in-depth understanding of system, model and different types of simulations. The objective of this course is to provide a basic treatment of all the important aspects of modeling and simulations. This course explores the process of model and simulation, verification and validation of simulation model and its real word applications in various fields, such as inventory system model, computer center model and Reliability estimation.

8. Outline syllabus		CO Mapping
Unit 1	**Introduction to System Modeling and Simulation**	
A	Introduction to system, components of system, system environment	CO1
B	Concept of simulation	CO1
C	Advantages and Disadvantages of simulation	CO1
Unit 2	**Probability & Random Number Generation**	
A	Introduction to basic of probability,	CO2
B	Probability distribution: PMF, PDF, CDF.	CO2,CO3
C	Continuous and discrete system simulation	CO3
Unit 3	**System Modeling Concepts**	
A	Types of system and Model	CO4
B	Comparison of simulation and Analytical Method	CO4
C	Inverse transformation method, Monte-Carlo Simulation	CO4
Unit 4	**Queuing Systems & Discrete System Simulation**	
A	Queuing system, Arrival process and Service distribution	CO5
B	M/M/1 queue, M/M/1/N queuing model, M/M/c queuing model, M/M/c/c queuing model.	CO5
C	Arrival pattern and discrete system simulation.	CO5,CO6
Unit 5	**Real World Application of Simulation**	
A	Just-in-Time model	CO5
B	Reliability estimation model	CO5,CO6
C	Job Shop Model, Simulation of an inventory.	CO5,CO6
Mode of Examination	Assignment/Quiz	
Text Book	1. Singh, P. and Singh, N., Modeling and Simulation, S.K. Kataria & Sons.	
Other Reference	1. **Frank L. Severance**, System Modeling and Simulation: An Introduction, WILEY.	