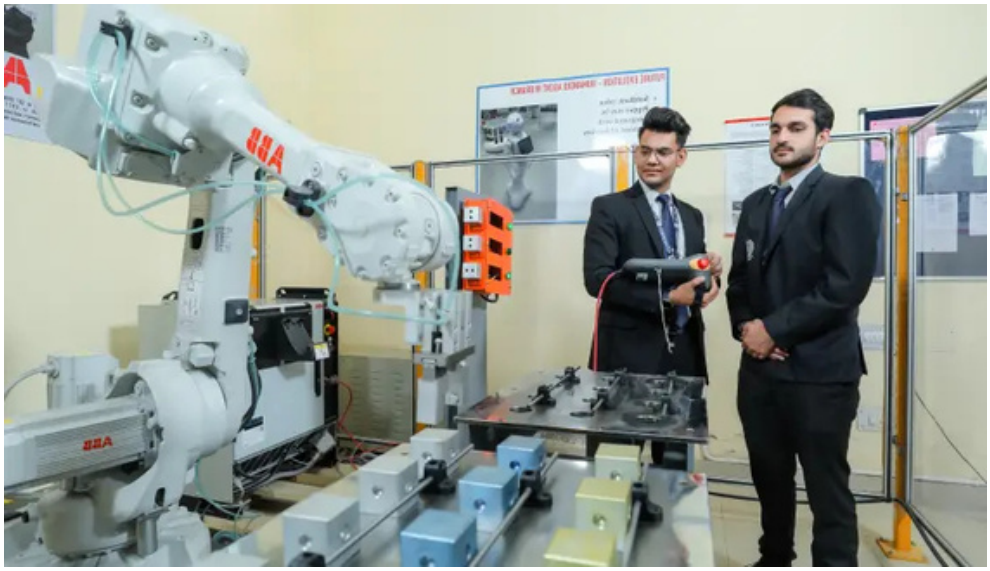
SGT UNIVERSITY

VALUE ADDED COURSES



Faculty of Engineering & Technology 2024-25

About the University

SGT University, established in 2013 and recognized by the University Grants Commission (UGC), has set its sights on fostering a culture of research, innovation, and interdisciplinary education. Nestled on a sprawling 70-acre campus on the outskirts of Gurgaon, the university boasts state-of-the-art resources and infrastructure designed to facilitate cutting-edge academic and research achievements.

Driven by a relentless pursuit of excellence, SGT University has earned the prestigious NAAC A+ accreditation, becoming one of the youngest institutions in the country to receive this honour. This recognition highlights the university's commitment to maintaining high standards in education and research.

Among its broad array of academic programs, the university offers premier medical courses through the SGT Medical College, Hospital & Research Institute, which are considered among the best in the nation. These programs are seamlessly integrated with practical training and research opportunities, ensuring that students receive a comprehensive, world-class education in the medical field.

Our Vision

To nurture individual's excellence through value based, cross-cultural, integrated and holistic education adopting the contemporary and advanced means blended with ethical values to contribute in building a peaceful and sustainable global civilization.

Our Mission

- To impart higher education at par with global standards that meets the changing needs of the society
- To provide access to quality education and to improve quality of life, both at individual and community levels with advancing knowledge in all fields through innovations and ethical research.
- To actively engage with and promote growth and welfare of the surrounding community
- through suitable extension and outreach activities
- To develop socially responsible citizens, fostering ethical values and compassion through participation in community engagement, extension and promotion activities.
- To create competitive and coordinated environment wherein the individual develops skills and a lifelong learning attitude to excel in their endeavours.

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INTRODUCTION

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In the dynamic and ever-changing global landscape, the need for lateral thinking, innovation, and entrepreneurial spirit has never been greater. Traditional educational approaches that focus solely on specific skill sets often become outdated due to the rapid pace of technological advancements. As such, no university curriculum can comprehensively address all areas of importance or relevance. To ensure that students are better equipped to meet industry demands, it is crucial for higher education institutions to supplement the core curriculum, helping students develop both their aptitudes and interests.

Objectives:

The primary objectives of the Value-Added Course (VAC) are:

1. To enhance industry understanding: Equip students with knowledge of industry expectations and requirements.
2. To improve employability: Enhance students' employability skills, making them more competitive in the job market.
3. To bridge skill gaps: Address existing gaps in skills and ensure students are industry ready.
4. To foster inter-disciplinary skills: Provide students with opportunities to develop diverse skills across various disciplines.
5. To encourage entrepreneurship: Inspire students to become job creators rather than just job seekers.

Course Design

Departments designing Value-Added Courses should begin by conducting a **Training Need Analysis** and engaging with industry experts, alumni, and employers to identify skill gaps and emerging trends. This will guide the creation of a syllabus tailored to current demands.

Conduction of Value-Added Courses

- Voluntary Participation: VAC is not a mandatory requirement for completing any academic program, and the credits earned through these courses are additional to the degree's total credit requirement.
- Learning Format: VAC is an instructor-supported learning course, available to all students without any additional fee. Classes are typically scheduled during reserved time slots, beyond regular class hours, and may also be conducted on weekends or during vacations.
- Course Registration: Students may register for only one Value-Added Course per semester, preferably offered by their own department. However, with prior permission from the Dean, they can take courses from other departments.

- Minimum Participants: A minimum of 5 students must opt for a course for it to be offered.
- Industry and Expert Involvement: Eminent industry professionals or academicians may conduct VACs. This broadens students' exposure and enhances the learning experience.

Course Duration and Structure

- Duration: Each Value-Added Course should last at least 30 hours, with a balanced structure of 18 hours (60%) theory and 12 hours (40%) practical. The exact division of theory and practical hours will be determined by the course instructor with the approval of the Dean.
- Location: The courses will be conducted within the respective schools, with classrooms assigned by the Dean based on student numbers.

REGISTRATION PROCEDURE

1. Course Listings: A list of available Value-Added Courses, along with syllabi, will be posted on the university website.
2. Registration Process: Students must complete and submit a registration form to enroll in a course. The Department Head will group students based on their choices and send them to the Dean for final approval.
3. Attendance and Assessment Records: The course instructor is responsible for maintaining attendance and assessment records, including details on assignments, seminars, and other activities. These records must be signed by both the course instructor and the Department Head and kept for future reference.
4. Attendance Requirements: Students must maintain at least 75% attendance in the Value-Added Course to be eligible for a certificate. Up to a 10% relaxation in attendance may be granted for valid reasons, such as illness or extracurricular participation.

Certification

Upon successfully completing a Value-Added Course, students will be awarded a **certificate** signed by the authorized university signatories, recognizing their accomplishment in the course.

Introduction to Data Science

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Course Code: VAC/FEAT/004

COURSE OBJECTIVES:

- Understand the fundamental concepts of data science.
- Apply data preprocessing techniques for cleaning and transforming data.
- Perform exploratory data analysis using statistical and visualization techniques.
- Implement basic machine learning models for predictive analysis.
- Interpret model performance and draw insights from data-driven decisions.

COURSE OUTCOMES:

- Understand and Explain Core Concepts of Data Science
- Perform Data Collection, Cleaning, and Preprocessing.
- Conduct Exploratory Data Analysis (EDA) and Visualization
- Apply Basic Machine Learning Techniques for Data Analysis.

COURSE CONTENT:

Module I: Introduction to Data Science

- Definition and importance of Data Science
- Differences between Data Science, AI, ML, and Big Data
- Applications of Data Science in different domains
- Overview of the Data Science pipeline

Module II: Data Collection & Preprocessing

- Types of data: Structured, Unstructured, Semi-structured
- Sources of data: Databases, APIs, Web Scraping, Open Datasets
- Data cleaning: Handling missing values, duplicates, and outliers
- Data transformation: Normalization, Standardization, Encoding categorical variables
- Feature Engineering concepts

Module III: Exploratory Data Analysis (EDA)

- Descriptive statistics: Measures of central tendency & dispersion
- Data visualization: Histograms, Box Plots, Scatter plots
- Identifying patterns, trends, and correlations
- Handling imbalanced datasets

Module IV: Introduction to Machine Learning

- Supervised vs Unsupervised Learning
- Overview of regression and classification
- Introduction to clustering techniques
- Model evaluation metrics (Accuracy, Precision, Recall, F1-score

Module 5: Data Science Tools & Technologies

- Overview of Python/R for Data Science
- Introduction to libraries: Pandas, NumPy, Matplotlib, Seaborn
- Basics of SQL for data extraction and manipulation
- Introduction to cloud-based data science platforms (Google Collab, Kaggle)

REFERENCES:

- "Introduction to Data Science" – Joel Grus
- "Data Science for Business" – Foster Provost & Tom Fawcett
- "Python for Data Analysis" – Wes McKinney

AutoCAD for basic and advanced Modelling

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Course Code: VAC/FEAT/005

COURSE OBJECTIVES:

- Understand the AutoCAD interface, tools, and commands.
- Develop 2D drawings and blueprints with accuracy.
- Create and manipulate 3D models using advanced tools.
- Apply real-world applications in architecture, mechanical, and civil design.
- Prepare for industry use with rendering, file management, and automation.

COURSE OUTCOMES:

- Create Precise 2D Drawings: Develop accurate technical drawings using AutoCAD drafting tools, layers, and dimensioning techniques.
- Design and Modify 3D Models: Construct and edit 3D solid, surface, and mesh models for architectural, mechanical, and civil applications.
- Enhance Workflow Efficiency: Utilize parametric constraints, dynamic blocks, and external references for streamlined project management.
- Prepare Industry-Standard Technical Drawings: Generate and print detailed blueprints, section views, and layouts for real-world projects.

COURSE CONTENT:

Module 1: Fundamentals of 2D Drafting

- Introduction to AutoCAD, UI, and Basic Drawing Commands
- Object Modifications (Move, Copy, Trim, Extend, Array, etc.)
- Layers, Line Types, and Object Properties
- Text, Annotations, and Dimensions
- Hatching, Gradients, and Patterning
- Blocks and Attributes for Reusable Components

Module 2: Intermediate 2D & Introduction to 3D

- Advanced Selection, Dimensioning, and Scaling
- Parametric Constraints and Dynamic Blocks
- External References (Xrefs) and File Management
- Introduction to 3D Modelling, UCS, and Viewports

Module 3: Advanced 3D Modelling & Industry Applications

- Advanced Surface Modelling, 3D Arrays, and Patterns
- Section Views and 3D Drafting Techniques
- Converting 2D Sketches into 3D Models and Vice Versa

- BIM and Interoperability with Revit, SketchUp, SolidWorks
- Walkthroughs, Presentations, and Animations
- Final Review, Certification Exam, and Q&A

REFERENCES:

- Mastering AutoCAD 2024 and AutoCAD LT 2024 – George Omura & Brian C. Benton Covers detailed 2D & 3D modelling, customization, and advanced tools.
- AutoCAD 2024 for Beginners – CADFolks A simple step-by-step guide for beginners covering 2D and 3D basics.
- Engineering Graphics with AutoCAD 2024 – James D. Bethune Focuses on engineering applications and includes technical drawings.

Online Resources:

- Autodesk Official Documentation – https://help.autodesk.com
- Lynda (LinkedIn Learning) AutoCAD Courses – AutoCAD tutorials for all levels
- CADTutor.net – Free AutoCAD tutorials and community forum
- YouTube Channels:
  - AutoCAD Tips & Tricks – Autodesk Official
  - SourceCAD – Tutorials for beginners and advanced users

Introduction to Sustainability

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Course Code: VAC/FEAT/006

COURSE OBJECTIVES:

- Understand the fundamental concepts of sustainability and sustainable development. Explore global environmental issues and their impact on ecosystems and societies. Learn about sustainable practices in industries such as construction, manufacturing, and energy.
- Analyse policies, regulations, and frameworks related to sustainability. Develop problem-solving skills for sustainability challenges through case studies and projects.

COURSE OUTCOMES:

- Explain Key Sustainability Concepts – Understand environmental, economic, and social aspects of sustainability.
- Identify Global Environmental Challenges – Analyse issues such as climate change, biodiversity loss, and pollution.
- Apply Sustainable Practices – Implement sustainable solutions in industries like construction, energy, and waste management.
- Evaluate Policies and Frameworks – Assess national and international sustainability policies, agreements, and frameworks.
- Design Solutions for Sustainability Challenges – Develop practical and innovative approaches for promoting sustainability.

COURSE CONTENT:

Module I: Fundamentals of Sustainability

- Introduction to Sustainability and Sustainable Development Goals (SDGs)
- Environmental, Economic, and Social Dimensions of Sustainability
- Global Environmental Challenges (Climate Change, Pollution, Resource Depletion)
- Circular Economy and Sustainable Resource Management
- Biodiversity Conservation and Ecosystem Services
- Sustainable Cities and Communities
- Role of Individuals, Businesses, and Governments in Sustainability
- Sustainable Consumption and Production Patterns

Module II: Industry Applications and Policies

- Sustainable Energy Solutions (Renewable Energy, Energy Efficiency)
- Green Building and Sustainable Construction
- Sustainable Agriculture and Food Systems
- Corporate Sustainability and Business Responsibility

Module 3: Innovation and Future Perspectives

- Sustainable Innovation and Green Technologies
- Climate Change Mitigation and Adaptation Strategies
- Role of Artificial Intelligence and Digital Tools in Sustainability
- Final Review, Certification Exam, and Q&A

REFERENCES:

- Sustainability: Principles and Practice – Margaret Robertson, Covers the core principles and real-world applications of sustainability.
- The Age of Sustainable Development – Jeffrey D. Sachs, Provides a global perspective on sustainable development challenges.
- Cradle to Cradle: Remaking the Way We Make Things – William McDonough & Michael Baumgart, Discusses the principles of sustainable design and circular economy.

Online Resources:

United Nations Sustainable Development Goals – https://sdgs.un.org
Environmental Protection Agency (EPA) – https://www.epa.gov
Coursera & edX Sustainability Courses – Online sustainability education resources