

<b>Business Intelligence and Analytics</b>			
Course Code	22SDS31	CIEMarks	50
Teaching Hours/Week (L:P:SDA)	3:0:2	SEEMarks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning Objectives:</b>			
<ul style="list-style-type: none"> <li>Assessment of the technologies for decision making, automated decision systems, and sentiment analysis methods</li> <li>Describe business intelligence, analytics, and decision support systems</li> <li>Demonstrate Multiple Criteria Systems for making decisions and methods for predictive modelling</li> </ul>			
<b>Module-1</b>			
Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-2</b>			
Introduction and Definitions, Phases of the Decision Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-3</b>			
Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis, Speech Analytics.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-4</b>			
Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making With Pairwise Comparisons.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-5</b>			
Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, and Development of Expert Systems.			

<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study																
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ul style="list-style-type: none"> <li>• The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>• Each full question will have a sub-question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module</li> </ul>																	
<p><b>Suggested Learning Resources:</b></p> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Ramesh Sharda, Dursun Delen, Efraim Turban, J.E. Aronson, Ting-Peng Liang, David King, "Business Intelligence and Analytics: System for Decision Support", 10th Edition, Pearson Global Edition.</li> </ol> <p><b>Reference books</b></p> <ol style="list-style-type: none"> <li>1. Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017 by Edward Miz</li> </ol>																	
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://shorturl.at/iuAT0">https://shorturl.at/iuAT0</a></li> <li>2. <a href="https://www.coursera.org/courses?query=business%20intelligence">https://www.coursera.org/courses?query=business%20intelligence</a></li> </ol>																	
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.</p>																	
<p><b>Course outcome (Course Skill Set)</b> At the end of the course the student will be able to:</p>																	
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**Program Outcome of this course**

Sl.No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	P01
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	P02
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	P03
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	P04
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	P05
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	P06
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business, societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.	P07
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	P08
9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	P09
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	P010
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	P011
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	P012

**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	X									
C02	X									
C03		X	X							
C04		X		X	X					

SDS 2022 Syllabus

<b>HighPerformanceComputing</b>			
CourseCode	22SDS321	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>CourseLearningobjectives:</b>			
<ul style="list-style-type: none"> <li>• Determinethemethods,costs,andfrequencymodelsforI/Operformanceconcerns.</li> <li>• Appreciatecommunicationlatencies,paralleldesigns,andconnectivitynetworks.</li> <li>• Setaperformancemodelwiththeappropriatescalingbaselinerefinement.</li> </ul>			
<b>Module-1</b>			
<b>ModernprocessorsandBasicoptimizationtechniquesforserialcode:</b> Stored-programcomputer architecture,General-purposecache-basedmicroprocessorarchitecture,Vectorprocessors.Scalarprofiling,Commonsense optimizations,Simplemeasures,large impact,The roleofcompilers,C++optimizations.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
<b>Data access optimization and Parallel computers:</b> Balance analysis and light speed estimates, Case study:The Jacobi algorithm, Case study: Dense matrix transpose, Algorithm classification and accessoptimizations,Casestudy:Sparsmatrix-vectormultiply.Taxonomyofparallelcomputingparadigms,Shared-memorycomputers, Distributed-memorycomputers,Hierarchical(hybrid)systems,Networks.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
<b>Basics of parallelization and Shared-memory parallel programming with OpenMP:</b> Parallelism, Parallescalability,Factorsthatlimitparallelexecution,Scalabilitymetrics,Simplescalabilitylaws,Parallelefficiency , Serial performance versus strong scalability, Refined performancemodels,Choosing therightscalingbaseline,Casestudy:Canslowerprocessorscomputefaster?, Loadimbalance.Shared-memoryparallel programmingwithOpenMP:ShortintroductiontoOpenMP,Casestudy:OpenMP-parallel Jacobi algorithm.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
<b>Efficient Open MP programming and Locality optimizations on ccNUMA architectures:</b> Profiling OpenMPprograms, Performance pitfalls, Case study: Parallel sparse matrix-vector multiply.LocalityoptimizationsonccNUMAarchitectures:LocalityofaccessonccNUMA,Casestudy:ccNUMAoptimiza tionofsparseMVM, Placement pitfalls,ccNUMAissueswithC++.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-5</b>			

Distributed-memory parallel programming with MPI and Efficient MPI programming: Message passing, A short introduction to MPI, Example: MPI parallelization of a Jacobian solver. Efficient MPI programming: MPI performance tools, Communication parameters, Synchronization, serialization, contention, Reducing communication overhead, Understanding in- and out-of-node point-to-point communication.

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<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study													
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<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Georg Hager and Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers", Taylor &amp; Francis Group.</li> <li>2. "High Performance Computing A Chapter Sampler", Taylor &amp; Francis Group, CRC Press.</li> </ol>														
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.udacity.com/course/high-performance-computing--ud281">https://www.udacity.com/course/high-performance-computing--ud281</a></li> <li>2. <a href="https://shorturl.at/guSX1">https://shorturl.at/guSX1</a></li> </ol>														
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared reports shall be evaluated for CIE marks.</p>														
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course the student will be able to:</p>														
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**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	X	X								
C02		X	X							
C03			X	X						

SDS 2022 Syllabus



<b>CyberSecurityandCyberLaw</b>			
CourseCode	22SDS322	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>CourseLearningobjectives:</b>			
<ul style="list-style-type: none"> <li>• Makethelearnersawareofthesocialandintellectualpropertyissuesatarearisin"cyberspace"</li> <li>• Discoverthelegalandpolicydevelopmentsinvariouscountriestoregulatecyberspace</li> <li>• Draughttheunderstandingofrelationshipbetweencommerceandcyberspace</li> </ul>			
<b>Module-1</b>			
Introduction to Cybercrime: Cybercrime: Definition and Origins of theWord,CybercrimeandInformationSecurity,WhoareCybercriminals?,ClassificationofCybercrimes,Cybercrime:TheLegalPerspectives,Cybercrimes:AnIndianPerspective,CybercrimeandtheIndianITA2000,AGlobalPerspectiveonCybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyberoffenses:HowCriminalsPlanThem:HowCriminalsPlan theAttacks,Social Engineering,Cyberstalking, Cybercafeand Cybercrimes,Botnets:TheFuelfor Cybercrime,AttackVector,CloudComputing.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
Understanding Computer Forensics: Introduction, Historical Background of Cyberforensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics.			
<b>Teaching-</b>			

<b>Learning Process</b>	Chalk and Talk/PPT/Webresources
<b>Module-5</b>	
Introduction to Security Policies and Cyber Laws: Need for An Information Security Policy, Information Security Standards – Iso, Introducing Various Security Policies and Their Review Process, Introduction to Indian Cyber Law, Objective and Scope of the Act, 2000, Intellectual Property Issues, Overview of Intellectual-Property-Related Legislation in India, Patent, Copyright, Law Related to Semiconductor Layout and Design, Software License.	
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ul style="list-style-type: none"> <li>• The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>• Each full question will have a sub-question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module</li> </ul>	
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives Nina Godbole and Sunit Belapure Wiley India Pvt Ltd.</li> <li>2. Introduction to information security and cyber laws Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla Dreamtech Press.</li> </ol>	
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=inWWhr5tnEA">https://www.youtube.com/watch?v=inWWhr5tnEA</a></li> <li>2. <a href="https://www.youtube.com/watch?v=lpa8uy4DyMo">https://www.youtube.com/watch?v=lpa8uy4DyMo</a></li> </ol>	
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared reports shall be evaluated for CIE marks.</p>	

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl.No.	Description	Blooms Level
C01	Make Learner Conversant With The Social And Intellectual Property Issues Emerging From 'Cyberspace	L2
C02	Explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace	L3
C03	Develop The Understanding Of Relationship Between Commerce And Cyberspace	L4

**Mapping of COs and Pos**

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	X	X								
C02		X	X							
C03			X	X						

<b>Cloud Computing for Data Analysis</b>			
Course Code	22SDS323	CIEMarks	50
Teaching Hours/Week(L:P:SDA)	3:0:0	SEEMarks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
<ul style="list-style-type: none"> <li>• Deployment of scalable cloud computing with powerful analytics software.</li> <li>• Identify patterns in data and to extract new insights.</li> <li>• Data analysis to gain a competitive advantage, to advance scientific discovery, or to improve life in all sorts of ways.</li> </ul>			
<b>Module-1</b>			
<b>Introduction, Cloud Infrastructure:</b> Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, User experience and software licensing. Exercises and problems.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-2</b>			
<b>Cloud Computing: Application Paradigms.:</b> Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper, The Map Reduce programming model, A case study: The GreTheWeb application, Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research, Social computing, digital content and cloud computing.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-3</b>			
<b>Cloud Resource Virtualization:</b> Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xena VMM based paravirtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines, The dark side of virtualization, Exercises and problems.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Web resources		
<b>Module-4</b>			
<b>Cloud Resource Management and Scheduling:</b> Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized automatic performance managers, Utility-based model for cloud-based Web services, Resource bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling MapReduce applications subject to deadlines, Resource management and dynamic scaling, Exercises and problems.			

**Teaching-  
Learning**

ChalkandTalk/PPT/Webresources

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<b>Process</b>	
<b>Module-5</b>	
<p><b>Cloud Security, Cloud Application Development:</b> Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it, How to use S3 in Java, Cloud-based simulation of a distributed trust algorithm, A trust management service, A cloud service for adaptive data streaming, Cloud based optimal FPGA synthesis. Exercises and problems.</p>	
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study
<p><b>Assessment Details (both CIE and SEE)</b>  The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ul style="list-style-type: none"> <li>• The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>• Each full question will have a sub-question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module</li> </ul>	
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Dan C Marinescu, "Cloud Computing Theory and Practice", Elsevier.</li> <li>2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Computing Principles and Paradigms", Wiley.</li> <li>3. John W Rittinghouse, James F Ransome, "Cloud Computing Implementation, Management and Security", CRC Press.</li> </ol>	
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://shorturl.at/uvBRV">https://shorturl.at/uvBRV</a></li> <li>2. <a href="https://shorturl.at/irSZ3">https://shorturl.at/irSZ3</a></li> </ol>	
<p><b>Skill Development Activities Suggested</b>  The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared reports shall be evaluated for CIE marks.</p>	

**Course outcome(Course Skill Set)**

At the end of the course the student will be able to :

Sl.No.	Description	BloomsLevel
C01	Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing	L2
C02	Analyze various cloud programming models	L3
C03	Apply resource management data analytic to solve problems on the cloud	L4

**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	X	X								
C02		X	X							
C03			X	X						

<b>BlockchainTechnology</b>			
CourseCode	22SDS324	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>CourseLearningobjectives:</b>			
<ul style="list-style-type: none"> <li>• Technologymaketheblockchaindecentralizationandcryptophyconcepts</li> <li>• Setoutthebitcoinhighlightsanditselectivealternatives.</li> </ul>			
<b>Module-1</b>			
Blockchain101:Distributedsystems,Historyofblockchain,Introductiontoblockchain,Typesofblockchain,CAPtheorem andblockchain,Benefitsandlimitationsofblockchain.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes todecentralization,Decentralizedorganizations.CryptophyandTechnicalFoundations:Cryptographicprimitives, Asymmetriccryptophy,Publicandprivatekeys			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
Bitcoinand Alternative CoinsA:Bitcoin,Transactions, Blockchain,BitcoinpaymentsB:Alternative Coins,Theoreticalfoundations,Bitcoinlimitations,Namecoin,Litecoin,Primecoin,Zcash			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
Smart ContractsandEthereum101:Smart Contracts:Definition,Ricardian contracts.Ethereum101:Introduction,Ethereumblockchain,ElementsoftheEthereumblockchain,Precompiled contracts.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-5</b>			
AlternativeBlockchains:BlockchainsBlockchain-OutsideofCurrencies:InternetofThings,Government,Health,Finance,Media			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/CaseStudy		



**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

1. Three Unit Tests each of 20 Marks
2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

**Suggested Learning Resources:****Books**

1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Author- Imran Bashir, Packt Publishing Ltd, Second Edition.
2. Bitcoin and Cryptocurrency Technologies, Author- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University.
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Author- Daniel Drescher, Apress, First Edition.
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition.

**Weblinks and Video Lectures (e-Resources):**

1. <https://shorturl.at/cvwyQ>
2. <https://shorturl.at/gyVXY>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

Sl. No.	Description	Blooms Level
CO1	Understand the types, benefits and limitation of blockchain	L2
CO2	Investigate the blockchain decentralization and cryptography concepts	L3
CO3	Identify the Bitcoin features and its alternative options.	L4

**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	X	X								
C02		X	X							
C03			X	X						

SDS 2022 Syllabus

SpatialDataAnalysis			
CourseCode	22SDS325	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>CourseLearningobjectives:</b>			
<ul style="list-style-type: none"> <li>Markedtechniquesandmodelsforspatialdata,relateanalyticsforimplicationsofspatialdata.</li> <li>Estimatetheconceptualmodelsandvisualizationmethodsforspatialdata</li> </ul>			
<b>Module-1</b>			
Introduction, local models and methods, what is local, spatial dependence and autocorrelation, spatial scale,stationarity, spatial data models, datasets used for illustrative purposes. Local modelling: standard methodsandlocalvariations,approachestolocaladaption,stratificationorsegmentationofspatialdata, Categorisinglocal statisticalmodels.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
Griddata:Exploringspatialvariationingriddedvariables,globalunivariatestatistics,localunivariatestatistics, analysis of grid data, moving windows for grid analysis, wavelets, segmentation, analysis of digitalelevation models. Spatial patterning in single variables:Localsummarystatistics,geographicallyweightedstatistics, Spatialautocorrelation:Globalandlocalmeasures,Spatialassociationandcategoricaldata.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
Spatialrelations:Globalregression,spatialandlocalregression,regressionandspatialdata,spatialautoregressivem odels,multilevelmodelling,allowingforlocalvariationinmodelparameters,movingwindow regression, geographically weighted regression, spatially weighted classification, local regressionmethods:someprosandcons.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
Spatial prediction 1: Deterministic methods, curve fitting, and smoothing: Point interpolation, global methods,local methods,areainterpolation,general approaches: overlay,local models and local data,limitations: pointandareainterpolation.			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-5</b>			
Spatialprediction2:Geostatistics:randomfunctionmodels,stationarity,globalmodels,exploringspatialvariation,kri gging,globallyconstantmean:simplekriging,locallyconstantmeanmodels,cokriging,equivalenceofsplinesandkrigin g,conditionalsimulation,otherapproaches,localapproaches,nonstationaryvariogram,variogramsin textureanalysis.			

<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study													
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> <li>5. The students will have to answer five full questions, selecting one full question from each module</li> </ol>														
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Christopher D. Lloyd, "Local Models for Spatial Analysis", 2<sup>nd</sup> Edition, CRC Press.</li> <li>2. Robert Haining, "Spatial Data Analysis: Theory and Practice", Cambridge University Press.</li> <li>3. Arthur Getis, Barry Boots, "Models of Spatial Processes", Cambridge University Press.</li> </ol>														
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://shorturl.at/bhBR2">https://shorturl.at/bhBR2</a></li> <li>2. <a href="https://shorturl.at/CRW02">https://shorturl.at/CRW02</a></li> </ol>														
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.</p>														
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course the student will be able to:</p> <table border="1" data-bbox="185 1644 1468 1774"> <thead> <tr> <th>Sl.No.</th> <th>Description</th> <th>Blooms Level</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td>Analyze techniques and models for spatial data.</td> <td>L2</td> </tr> <tr> <td>CO2</td> <td>Apply analytics for implications of spatial data.</td> <td>L3</td> </tr> <tr> <td>CO3</td> <td>Analyze the conceptual models and visualization methods for spatial data.</td> <td>L4</td> </tr> </tbody> </table>			Sl.No.	Description	Blooms Level	CO1	Analyze techniques and models for spatial data.	L2	CO2	Apply analytics for implications of spatial data.	L3	CO3	Analyze the conceptual models and visualization methods for spatial data.	L4
Sl.No.	Description	Blooms Level												
CO1	Analyze techniques and models for spatial data.	L2												
CO2	Apply analytics for implications of spatial data.	L3												
CO3	Analyze the conceptual models and visualization methods for spatial data.	L4												

**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	X	X								
C02		X	X							
C03			X	X						

SDS 2022 Syllabus

<b>Natural Language Processing and Text Mining</b>			
Course Code	22SDS331	CIEMarks	50
Teaching Hours/Week(L:P:SDA)	3:0:0	SEEMarks	50
Total Hoursof Pedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>Course Learning Objectives:</b>			
<ul style="list-style-type: none"> <li>• Explain the fundamental concepts and techniques of natural language processing (NLP).</li> <li>• Explore the computational properties of natural languages.</li> <li>• Discuss the commonly used algorithms for processing linguistic information</li> </ul>			
<b>Module-1</b>			
OVERVIEW AND LANGUAGE MODELLING: Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modelling: Various Grammar- based Language Models-Statistical Language Model.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Webresources		
<b>Module-2</b>			
WORD LEVEL AND SYNTACTIC ANALYSIS: Word Level Analysis: Regular Expressions-Finite State Automata-Morphological Parsing-Spelling Error Detection and correction- Words and Word Classes-Part-of-Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency-Parsing Probabilistic Parsing.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Webresources		
<b>Module-3</b>			
Extracting Relations from Text: From Word Sequences to Dependency Paths: Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles: Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labelling, Learning to Annotate Cases with Knowledge Roles and Evaluations. A Case Study in Natural Language Based Web Search: InFact System Overview, The GlobalSecurity.org Experience.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Webresources		
<b>Module-4</b>			
Evaluating Self-Explanations in iSTART: Word Matching, Latent Semantic Analysis, and Topic Models: Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems, Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures: Introduction, Cohesion, Coh-Matrix, Approaches to Analysing Texts, Latent Semantic Analysis, Predictions, Results of Experiments. Automatic Document Separation: A Combination of Probabilistic Classification and Finite-State Sequence Modelling: Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results. Evolving Explanatory Novel Patterns for Semantically Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.			
<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Webresources		
<b>Module-5</b>			

INFORMATIONRETRIEVALANDLEXICALRESOURCES:InformationRetrieval:DesignfeaturesofInformationRetrievalSystems-Classical,Nonclassical,AlternativeModelsofInformationRetrieval-valuationLexicalResources:WorldNet-FrameNet-Stemmers-POSTagger-ResearchCorpora.

SDS 2022 Syllabus

<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study	
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> <li>5. The students will have to answer five full questions, selecting one full question from each module</li> </ol>		
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ul style="list-style-type: none"> <li>• <i>Natural Language Processing and Information Retrieval</i>, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press, 2008.</li> <li>• <i>Natural Language Processing and Text Mining</i>, Anne Kao and Stephen R. Potee, Springer-Verlag London Limited, 2007..</li> </ul>		
<p><b>Weblinks and Video Lectures (e-Resources):</b></p>		
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.</p>		
<p><b>Course outcome (Course Skill Set)</b></p>		
As the end of the course the student will be able to:	<b>Description</b>	<b>Blooms Level</b>
CO1	Analyze the natural language text.	L1
CO2	Generate the natural language.	L2
CO3	Demonstrate Text mining.	L2



**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>C01</b>			X							
<b>C02</b>	X	X					X	X		
<b>C03</b>				X						

SDS 2022 Syllabus

SOFTWARE PROJECT PLANNING & MANAGEMENT			
CourseCode	22SDS33 2	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<ul style="list-style-type: none"> <li>• Exploremethodsandtechniquesappropriatetodefining,planningandcarrying out a project within your chosen specialist area within themanagementofsoftwareprojects</li> <li>• Discusstheproject todevelopthescopeofwork,provideaccuratecostestimatesandtoplanthevariousactivities.</li> </ul>			
Module-1			
<p>Metrics: Introduction, The Metrics Roadmap, A Typical Metrics Strategy, What Should you Measure?, Set Targets and track Them, Understanding and Trying to minimize variability, Act on data, People and Organizational issues in Metrics Programs, Common Pitfalls to watch out for in Metrics Programs, Matrices implementation checklists and tools, Software configuration management: Introduction, Some Basic Definitions and terminology, the processes and activities of software configuration management, configuration status accounting, configuration audit, software configuration management in geographically distributed teams, Metrics in software configuration management, software configuration management tools and automation.</p>			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
Module-2			
<p>Risk Management: Introduction, What is risk management and why is it important?, Risk management cycle, Risk identification: common tools and techniques, Risk Quantifications, Risk Monitoring, Risk Mitigation, Risks and Mitigation in the context of global project teams, some practical techniques risk management, Metrics in risk management. Project Planning and Tracking: Components of Project Planning and Tracking, The “What “ Part of a Project Plan, The “What Cost “ Part of a Project Plan, The “When “ Part of Project Planning, The “How “ Part of a Project Planning: Tailoring of Organizational Processes For the Project, The “ By Whom “ Part of the Project Management Plan : Assigning Resources, Putting it all together : The Software Management Plan, Activities Specific to Project Tracking, Interfaces to the Process Database. Project Closure: When Does Project Closure Happen?. Why Should We Explicitly do a Closure?, An Effective Closure Process, Issues that Get Discussed During Closure, Metrics for Project Closure, Interfaces to the Process Database</p>			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
Module-3			
<p>Software Requirements gathering: Inputs and start criteria for requirements gathering, Dimensions of requirements gathering, Steps to be followed during requirements gathering, outputs and quality records from the requirements phase, skill sets required during requirements phase, differences for a shrinkwrapped software, challenges during the requirements management phase, Metrics for requirements phase. Estimation: What is Estimation? when and why is Estimation done?, the three phases of Estimation, Estimation methodology, formal models for size Estimation, Translating size Estimate into effort Estimate, Translating effort Estimates into schedule Estimate, common challenges during Estimation , Metrics for the Estimation processes. Design and Development Phases: Some differences in our chosen approach, salient features of design, evolving an architecture/ blueprint, design for reusability, technology choices/ constraints, design to standards, design for portability, user interface issues, design for testability, design for diagnose ability, design for maintainability, design for install ability, interoperability design, challenges during design</p>			

and development phases, skill sets for design and development, metrics for design and development phases.	
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources
<b>Module-4</b>	
Project management in the testing phase: Introduction, What is testing?, what are the activities that makeup testing?, test scheduling and types of tests, people issues in testing, management structures for testing in global teams, metrics for testing phase. Project management in the Maintenance Phase: Introduction, Activities during Maintenance Phase, management issues during Maintenance Phase, Configuration management during Maintenance Phase, skill sets for people in the maintenance phase, estimating size, effort, and people resources for the maintenance phase, advantages of using geographically distributed teams for the maintenance phase, metrics for the maintenance phase.	
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources
<b>Module-5</b>	
Globalization issues in project management: Evolution of globalization, challenges in building global teams, Models for the execution of global projects, some effective management techniques for managing global teams. Impact of the internet on project management: Introduction, the effect of internet on project management, managing projects for the internet, Effect on the project management activities. People focused process models: Growing emphasis on people centric models, people capability maturity model(P-CMM), other people focused models in the literature, how does an organization choose the models touse?	

<b>Teaching-Learning Process</b>	Chalk and Talk/PPT/Case Study													
<p><b>Assessment Details (both CIE and SEE)</b>  The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> <li>5. The students will have to answer five full questions, selecting one full question from each module</li> </ol>														
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Managing Global Projects, Ramesh Gopaldaswamy, Tata McGraw Hill, 2013</li> <li>2. Managing the Software Process, Watts Humphrey, Pearson Education, 2000</li> </ol>														
<p><b>Weblinks and Video Lectures (e-Resources):</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.tutorialspoint.com/software_engineering/software_project_management.htm">https://www.tutorialspoint.com/software_engineering/software_project_management.htm</a>  <a href="https://www.javatpoint.com/software-project-management">https://www.javatpoint.com/software-project-management</a> <a href="https://nptel.ac.in/courses/106105218">https://nptel.ac.in/courses/106105218</a></li> </ol>														
<p><b>Skill Development Activities Suggested</b>  The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.</p>														
<p><b>Course outcome (Course Skill Set)</b></p>														
<p>At the end of the course the student will be able to:</p>														
<table border="1"> <thead> <tr> <th data-bbox="177 1630 293 1637">Sl.No.</th> <th data-bbox="293 1630 1267 1637">Description</th> <th data-bbox="1267 1630 1476 1637">Blooms Level</th> </tr> </thead> <tbody> <tr> <td data-bbox="177 1637 293 1704">C01</td> <td data-bbox="293 1637 1267 1704">Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales</td> <td data-bbox="1267 1637 1476 1704">L3</td> </tr> <tr> <td data-bbox="177 1704 293 1771">C02</td> <td data-bbox="293 1704 1267 1771">Identify the resources required for a project and to produce a work plan and resource schedule</td> <td data-bbox="1267 1704 1476 1771">L2</td> </tr> <tr> <td data-bbox="177 1771 293 1850">C03</td> <td data-bbox="293 1771 1267 1850">Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift</td> <td data-bbox="1267 1771 1476 1850">L1</td> </tr> </tbody> </table>	Sl.No.	Description	Blooms Level	C01	Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales	L3	C02	Identify the resources required for a project and to produce a work plan and resource schedule	L2	C03	Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift	L1		
Sl.No.	Description	Blooms Level												
C01	Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales	L3												
C02	Identify the resources required for a project and to produce a work plan and resource schedule	L2												
C03	Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift	L1												

**Mapping of COs and POs**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>C01</b>	X									
<b>C02</b>		X			X		X			
<b>C03</b>			X					X		

SDS 2022 Syllabus

FINANCIAL DATA ANALYTICS			
CourseCode	22SDS33 3	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>CourseLearningobjectives:</b>			
<ul style="list-style-type: none"> <li>To provide a strong foundation in financial analytics in order to handle complex financial data, build advanced analytical models and deliver effective visualization product and comprehensive reports.</li> </ul>			
<b>Module-1</b>			
UNIVARIATE DATA DISTRIBUTIONS: Probability Distributions and Their Parameters, Observations and Nonparametric Density Estimation, Monte Carlo Computations			
<b>Teaching-LearningProcess</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
DEPENDENCE & MULTIVARIATE DATA EXPLORATION: Multivariate Data and First Measure of Dependence, The Multivariate Normal Distribution, Marginals and More Measures of Dependence, Copulas, Principal Component Analysis.			
<b>Teaching-LearningProcess</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
PARAMETRIC REGRESSION: Simple Linear Regression, Regression for Prediction & Sensitivities, Smoothing Versus Distribution Theory, Multiple Regression, Matrix Formulation and Linear Models, Polynomial Regression, Nonlinear Regression, Term Structure of Interest Rates: A Crash Course.			
<b>Teaching-LearningProcess</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
LOCAL AND NONPARAMETRIC REGRESSION: Review of the Regression Setup, Basis Expansion Regression, Nonparametric Scatterplot Smoothers, More Yield Curve Estimation, Multivariate Kernel Regression, Projection Pursuit Regression, Nonparametric Option Pricing.			
<b>Teaching-LearningProcess</b>	ChalkandTalk/PPT/Webresources		
<b>Module-5</b>			
TIME SERIES MODELS: AR, MA, ARMA, & ALL THAT: Notation and First Definitions, Time Dependent Statistics and Stationarity, First Examples of Models, Fitting Models to Data, Putting a Price on Temperature .			
<b>Teaching-LearningProcess</b>	Chalk andTalk/PPT/CaseStudy		

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

1. Three Unit Tests each of 20 Marks
2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

**Suggested Learning Resources:****Books****Text Book:**

1. *Statistical Analysis of Financial Data in R*, René Carmona Second Edition

**Reference Books:**

2. *Computational Finance An Introductory Course*, Argimiro Arratia (2014), Atlantis Press, ISBN 978-94-6239-069-0 Bernhard Pfaff (2013),
3. *Financial risk modelling and portfolio optimization*, Wiley, ISBN 978-0-470-97870-2 Cairns, A.J. G (2004)

**Weblinks and Video Lectures (e-Resources):**

1. [https://www.tutorialspoint.com/big\\_data\\_analytics/index.htm](https://www.tutorialspoint.com/big_data_analytics/index.htm)
2. [https://www.tutorialspoint.com/big\\_data\\_analytics/index.htm](https://www.tutorialspoint.com/big_data_analytics/index.htm)

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

Sl.No.	Description	Blooms Level
C01	Analyse and model financial data	L2
C02	Evaluate and model Risk on various financial assets (can be attained through assignment and CIE)	L3
C03	Use the most powerful and sophisticated routines in Python for analytical finance (can be attained through assignment and CIE)	L3

**Mapping of COs and POs**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>C01</b>	X	X								
<b>C02</b>	X	X	X							
<b>C03</b>	X		X	X						

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<b>PREDICTIVE ANALYSIS</b>			
CourseCode	22SDS33 4	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• Explore various classification and regression models.</li> <li>• Explore working of supervised and unsupervised algorithms.</li> <li>• Identify the best working models to solve real world problems.</li> </ul>			
<b>Module-1</b>			
Overview of Supervised Learning: Introduction, Variable Types and Terminology, Two Simple Approaches to Prediction: Linear Methods for Regression and Classification: Introduction, Linear regression models and least squares, , Subset selection , Shrinkage Methods, A Comparison of the Selection and Shrinkage Methods, Linear Discriminant Analysis, Logistic regression. Text Book 1:Chapters 2.1 – 2.3, 3.1 – 3.4, 3.6, 4.1, 4.3 – 4.4			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-2</b>			
Model Assessment and Selection: Bias, Variance, and model complexity, The Bias-variance Decomposition, Optimism of the training error rate, Estimate of In-sample prediction error, The Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, Conditional or Expected Test Error. Text Book 1:Chapters 7.1 – 7.7, 7.10 – 7.12			Model As Optimism paramete Test Error Text Book
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-3</b>			
Additive Models, Trees, and Related Methods: Generalized additive models, Tree-Based Methods, Boosting and Additive Trees: Boosting Methods, Exponential Loss and AdaBoost, Example: Spam Data, Numerical Optimization via Gradient Boosting , Illustrations (California Housing , New Zealand Fish, Demographic Data) Text Book 1: Chapters 9.1 – 9.2, 10.4, 10.8, 10.10, 10.13			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-4</b>			
Neural Networks: Introduction, Fitting Neural Networks, Some Issues in Training Neural Networks Support Vector Machines: Introduction, The Support Vector Classifier, Support Vector Machines and Kernels Unsupervised Learning and Random forests: Association rules, Cluster analysis, Details of Random Forests, Random forests and analysis. Text Book 1: Chapters 11.1, 11.3 – 11.5, 12.1 – 12.3, 14.1 – 14.3, 15.1 – 15.4			
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/Webresources		
<b>Module-5</b>			
ManagingState,TheProblemofStateinWebApplications,PassingInformationviaQueryStrings,PassingInformationviatheURLPath,Cookies,Serialization,SessionState,HTML5WebStorage,Caching,Advanced			

JavaScriptandjQuery,JavaScriptPseudo-Classes,jQueryFoundations,AJAX,AsynchronousFileTransmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services,XMLProcessing,JSON,OverviewofWebServices.	
<b>Teaching-Learning Process</b>	ChalkandTalk/PPT/CaseStudy
<b>AssessmentDetails(bothCIEandSEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50%(50 marks out of 100)in the sum total of the CIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)taken together.</p> <p><b>ContinuousInternalEvaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Test each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments / skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>SemesterEndExamination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> <li>5. The students will have to answer five full questions, selecting one full question from each module</li> </ol>	
<b>Suggested Learning Resources:</b>	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. <i>The Elements of Statistical Learning-Data Mining, Inference, and Prediction</i> Trevor Hastie, Robert Tibshirani, Jerome Friedman Springer 2009.</li> <li>2. <i>Introduction to Machine Learning</i>, E. Alpaydin PHI 2010.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. <i>Pattern Recognition and Machine Learning</i>, Christopher M. Bishop Springer 2007.</li> <li>2. <i>All of statistics</i>, L.Wasserman Springer 2004.</li> <li>3. <i>An Introduction to statistical learning with applications in R</i>, G. James, D. Witten, T. Hastie, R. Tibshirani Springer 2017</li> </ol>	
<b>WeblinksandVideoLectures(e-Resources):</b>	
<ul style="list-style-type: none"> <li>• <a href="https://www.udemy.com/tutorial/become-a-python-data-analyst/introduction-to-predictive-analytics-models/">https://www.udemy.com/tutorial/become-a-python-data-analyst/introduction-to-predictive-analytics-models/</a></li> <li>• <a href="https://intellipaat.com/blog/what-is-predictive-analytics/">https://intellipaat.com/blog/what-is-predictive-analytics/</a></li> </ul> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=Kd0C-8q0HkI">https://www.youtube.com/watch?v=Kd0C-8q0HkI</a></li> </ol>	

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

Sl. No.	Description	Blooms Level
C01	Apply Regression and classification models to solve real world problems (can be attained through assignment and CIE)	L3
C02	Identify and analyze different analytical models	L2
C03	Identify and apply Additive models to different data science related problems	L2
C04	Apply Supervised and Unsupervised learning techniques (can be attained through assignment and CIE)	L3
C05	Choose appropriate assessment evaluation criterion for different analytical methods	L2

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P01 0	P01 1	P01 2
C01	x		x									
C02	x	x										
C03	x		x									
C04	x		x									
C05	x	x										

**Mapping of COs and POs**

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Semantic Web & Social Networks			
CourseCode	22SDS33 5	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03
<b>Course Learning Objectives:</b> <ul style="list-style-type: none"> <li>To describe how the Semantic Web provides the key in aggregating information across heterogeneous sources</li> <li>To learn Knowledge Representation for the Semantic Web</li> <li>To analyze the social Web and the design of a new class of applications</li> </ul>			
<b>Module-1</b>			
Web Intelligence Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content: <a href="https://www.youtube.com/watch?v=Uiql42PGW6Y">https://www.youtube.com/watch?v=Uiql42PGW6Y</a>		
<b>Module-2</b>			
Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content: <a href="https://www.youtube.com/watch?v=rAkSY5Ha9vk">https://www.youtube.com/watch?v=rAkSY5Ha9vk</a>		
<b>Module-3</b>			
Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content: <a href="https://youtu.be/rhgUDGtT2EM?list=PLvgeTuKrhSLPbYIF0gW3V2ivGqevTQlCf">https://youtu.be/rhgUDGtT2EM?list=PLvgeTuKrhSLPbYIF0gW3V2ivGqevTQlCf</a>		
<b>Module-4</b>			
Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content: <a href="https://www.youtube.com/watch?v=aPlyXvEtUHM">https://www.youtube.com/watch?v=aPlyXvEtUHM</a>		
<b>Module-5</b>			
Social Network Analysis and semantic web What is social Networks analysis, Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.			

<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content: <a href="https://www.youtube.com/watch?v=yCXu10eDtcA">https://www.youtube.com/watch?v=yCXu10eDtcA</a>
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>1. Three Unit Tests each of 20 Marks</li> <li>2. Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> <li>5. The students will have to answer five full questions, selecting one full question from each module</li> </ol>	
<p><b>Suggested Learning Resources:</b></p> <p><b>TEXTBOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Thinking on the Web-Berners Lee, Godeland Turing, Wiley interscience.</li> <li>2. Social Networks and the Semantic Web, Peter Mika, Springer.</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley &amp; Sons.</li> <li>2. Semantic Web and Semantic Web Services-Liyang Lu Chapman and Hall/CRC Publishers, (Taylor &amp; Francis Group).</li> </ol>	
<p><b>Weblinks and Video Lectures (e-Resources):</b></p>	
<ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=yCXu10eDtcA">https://www.youtube.com/watch?v=yCXu10eDtcA</a></li> <li>• <a href="https://www.youtube.com/watch?v=Q7tyi1kp33w">https://www.youtube.com/watch?v=Q7tyi1kp33w</a></li> <li>• <a href="https://www.youtube.com/watch?v=QQCWHgclGB8">https://www.youtube.com/watch?v=QQCWHgclGB8</a></li> <li>• <a href="https://www.youtube.com/watch?v=QQCWHgclGB8&amp;t=1474s">https://www.youtube.com/watch?v=QQCWHgclGB8&amp;t=1474s</a></li> </ul> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/playlist?list=PL3JRjVnXiTBYHhu15oIX6ugN5B4oizwAb">https://www.youtube.com/playlist?list=PL3JRjVnXiTBYHhu15oIX6ugN5B4oizwAb</a></li> </ol>	
<p><b>Skill Development Activities Suggested</b></p> <p>The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared reports shall be evaluated for CIE marks.</p>	

<b>Course outcome (Course Skill Set)</b>		
At the end of the course the student will be able to:		
<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
C01	Summarize to create ontology and knowledge representation for the semantic web	L2
C02	Solve to build a blogs and social networks	L3
C03	Describe the Modeling and aggregating social network data.	L2
C04	Illustrate the Web-based social network and Ontology	L3

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	x											
<b>C02</b>				x								
<b>C03</b>			x									
<b>C04</b>		x										

<b>PROJECT WORK PHASE</b>			
<b>-1</b>			
Course Code	22SDS34	CIEMarks	100

NumberofcontactHours/Week	6	SEEMarks	--
Credits	03	ExamHours	--
<b>Courseobjectives:</b> <ul style="list-style-type: none"> <li>• Supportindependentlearning.</li> <li>• Guidetoselectandutilizeadequateinformationfrom variedresourcesmaintainingethics.</li> <li>• Guidetoorganizetheworkintheappropriatemannerandpresentinformation(acknowledgingthesources)clearly.</li> <li>• Developinteractive,communication,organisation,timemanagement,andpresentationskills.</li> <li>• Impartflexibilityandadaptability.</li> <li>• Inspireindependentandteamworking.</li> <li>• Expandintellectualcapacity,credibility,judgement,intuition.</li> <li>• Adheretopunctuality,settingandmeetingdeadlines.</li> <li>• Instilresponsibilitiestooneselfandothers.</li> <li>• Train students to present the topic of project work in a seminar without any fear, faceaudienceconfidently,enhancecommunicationsskill,involveingroupdiscussiontopresentandexchangeideas.</li> </ul>			
<b>Project Phase-1</b> Students in consultation with the guide/s shall carry out literature survey/visitindustries to finalize the topic of the Project. Subsequently, the students shall collect the materialrequired for the selected project, prepare synopsis and narrate the methodology to carry out theprojectwork. <b>Seminar:</b> Eachstudent,undertheguidanceofaFaculty,isrequiredto <ul style="list-style-type: none"> <li>• Presenttheseminarontheselectedprojectorallyand/orthroughpowerpointslides.</li> <li>• Answerthequeriesandinvolveindebate/discussion.</li> <li>• Submittwocopiesofthetypedreportwithalistofreferences.</li> </ul> Theparticipantsshalltakepartindiscussionoffosterfriendlyandstimulatingenvironmentinwhichthestudentsaremotivatedtoeachhighstandardsandbecomeself-confident.			
<b>Courseoutcomes:</b> Attheendofthecoursethestudentwillbeableto: <ul style="list-style-type: none"> <li>• Demonstrateasoundtechnicalknowledgeoftheirselectedprojecttopic.</li> <li>• Undertakeproblemidentification,formulation,andsolution.</li> <li>• Designengineeringsolutionstocomplexproblemsutilisingasystemsapproach.</li> <li>• Communicatewithengineersandthecommunityatlargeinwrittenanoralforms.</li> <li>• Demonstratetheknowledge, skills andattitudesofaprofessionalengineer.</li> </ul>			
<b>ContinuousInternalEvaluation</b> CIE marks for the project report (50 marks), seminar (30 marks) and question and answer (20marks) shall be awarded (based on the quality of report and presentation skill, participation in thequestion and answer session by the student) by the committee constituted for the purpose by theHeadoftheDepartment.ThecommitteeshallconsistofthreefacultyfromthedepartmentwiththeseniormostactingastheChairperson.			

SocietalProject			
CourseCode	22SDS35	CIEMarks	100
NumberofcontactHours/Week	6	SEEMarks	--
Credits	3	ExamHours	03



**Course objectives:**

- Build creative solutions for development problems of current scenario in the Society.
- Utilize the skills developed in the curriculum to solve real life problems.
- Improve understanding and develop methodology for solving complex issues.

**Some of the domains to choose for societal projects:**

- Infrastructure
- Health Care
- Social security
- Security for women
- Transportation
- Business Continuity
- Remote working and Education
- Digital Finance
- Food Security
- Rural employment
- Water and land management
- Pollution
- Financial Independence
- Agricultural Finance
- Primary Healthcare
- Nutrition
- Child Care
- E-learning
- Distance parenting
- Mentorship Etc

**Course outcomes:**

At the end of the course the student will be able to:

- Building solution for real life societal problems.
- Improvement of their technical/curriculum skills

**Continuous Internal Evaluation:**

**Identifying the real life problems and producing literature report: 20 marks**

**Sampling and Cleaning: 10 Marks**

**Establishing the right Objective: 10 Marks**

**Developing the solution: 20 Marks**

Propagating the solution to the stake holders 1) Lectures 2) Social Meetings 3) Social media 4) Street plays 5) Advertisement Either of the 3 (evidence of the work through Geo tag photo) Certified by stake holders and authorized by concerned government authorities.

**Project Report:** 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.

**Project Presentation:** 10 marks.

The Project Presentation marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

**Evaluation:** 10 marks.

The students shall be evaluated based on the ability in the Question and Answer session for 10 marks.

<b>INTERNSHIP/PROFESSIONAL PRACTICE</b>			
CourseCode	22SDSI36	CIEMarks	50
NumberofcontactHours/Week	3	SEEMarks	50
Credits	06	ExamHours	03
<p><b>Courseobjectives:</b>  Internship/Professionalpracticeprovide students the opportunity of hands-on experience thatinclude personal training, time and stress management, interactive skills, presentations, budgeting,marketing,liabilityandriskmanagement,paperwork,equipmentordering,maintenance,respondingtoemergenciesetc.Theobjectivearefurther,  Toputtheoryintopractice.  Toexpandthinkingandbroadentheknowledgeandskillsacquiredthroughcourseworkinthefield.  Torelateto, interact with,andlearnfromcurrentprofessionalsinthefield.  To gain a greater understanding of the duties and responsibilities of aprofessional.Tounderstandandadheretoprofessionalstandardsinthefield.  Togaininsighttoprofessionalcommunicationincludingmeetings,memos,reading,writing,publicspeaking,research, clientinteraction,inputof ideas,and confidentiality.  To identifypersonalstrengthsandweaknesses.  Todeveloptheinitiativeandmotivationtobeaself-starterandworkindependently.</p>			
<p><b>Internship/Professional practice:</b> Students under the guidance of internal guide/s and externalguideshalltakepartinalltheactivitiesregularlytoacquireasmuchknowledge as possiblewithoutcausinganyinconvenienceatthe place of internship.  <b>Seminar:</b>Eachstudent,isrequiredto</p> <ul style="list-style-type: none"> <li>• Presenttheseminarontheinternshiporallyand/orthroughpowerpointslides.</li> <li>• Answerthequeriesandinvolveindebate/discussion.</li> <li>• Submitthereportdulycertifiedbytheexternalguide.</li> <li>• Theparticipantsshalltakepartindiscussiontofosterfriendlyandstimulating environmentinwhichthestudentsaremotivated toreachhighstandardsandbecomeself-confident.</li> </ul>			
<p><b>Courseoutcomes:</b>  Attheendofthecoursethestudentwillbeableto:</p> <ul style="list-style-type: none"> <li>• Gainpracticalexperiencewithinindustryinwhichtheinternshipisdone.</li> <li>• Acquireknowledgeoftheindustryinwhichtheinternshipisdone.</li> <li>• Applyknowledgeandskillslearnedtoclassroomwork.</li> <li>• Develop a greater understanding about career options while more clearly defining personalcareergoals.</li> <li>• Experiencetheactivitiesandfunctionsofprofessionals.</li> <li>• Developandrefineoralandwrittencommunicationskills.</li> <li>• Identifyareasforfutureknowledgeandskilldevelopment.</li> <li>• Expandintellectualcapacity,credibility,judgment,intuition.</li> <li>• Acquiretheknowledgeofadministration,marketing,financeandconomics.</li> </ul>			
<p><b>ContinuousInternalEvaluation</b>  CIE marks for the Internship/Professional practice report (30 marks), seminar (10 marks) andquestion and answer session (10 marks) shall be awarded (based on the quality of report andpresentationskill,participationinthequestionandanswersessionbythestudent)bythecommittee constituted for the purpose by the Head of the Department. The committee shall consistofthreefacultyfromthedepartment with theseniormostactingastheChairperson.</p>			
<p><b>SemesterEndExamination</b>  SEE marks for the internship report (20 marks), seminar (20 marks) and question and answersession(10marks)shallbeawarded(basedonthequalityofreportandpresentationskill,participationinthequestion andanswersession)bytheexaminers appointedbytheUniversity.</p>			

<b>PROJECTWORKPHASE</b> -2			
CourseCode	22SDS41	CIEMarks	100
Practical/Fieldwork/Week	8	SEEMarks	100
Credits	18	ExamHours	03
<b>Courseobjectives:</b>			
<ul style="list-style-type: none"> <li>• Tosupportindependentlearning.</li> <li>• Toguidetoselectandutilizeadequateinformationfromvariedresourcesmaintainingethics.</li> <li>• Toguidetoorganizetheworkintheappropriatemannerandpresentinformation(acknowledgingthesources)clearly.</li> <li>• Todevelopinteractive,communication,organization,timemanagement,andpresentationskills.</li> <li>• Toimpartflexibilityandadaptability.</li> <li>• Toinspireindependentandteamworking.</li> <li>• Toexpandintellectualcapacity,credibility,judgement,intuition.</li> <li>• Toadheretopunctuality,settingandmeetingdeadlines.</li> <li>• Toinstillresponsibilitiestooneselfandothers.</li> <li>• Totrainstudentstopresentthetopicofprojectworkinaseminarwithoutanyfear,faceaudienceconfidently,enhancecommunicationskill,involveingroupdiscussiontopresentandexchangeideas.</li> </ul>			
<b>Project Work Phase - II:</b> Each student of the project batch shall involve in carrying out the projectwork jointly in constant consultation with internal guide, co-guide, and external guide and preparetheprojectreportasperthenormsavoidingplagiarism.			
<ul style="list-style-type: none"> <li>• Follow theSoftwareDevelopmentlifecycle</li> <li>• DataCollection,Planning</li> <li>• DesigntheTestcases</li> <li>• Validationandverificationofattainedresults</li> <li>• Significanceofparametersw.r.tscientificquantifieddata.</li> <li>• PublishtheprojectworkinreputedJournal.</li> </ul>			
<b>Courseoutcomes:</b>			
Attheendofthecoursethestudentwillbeableto:			
<ul style="list-style-type: none"> <li>• Presenttheprojectandbeabletodefendit.</li> <li>• Makelinksacrossdifferentareasofknowledgeandtogenerate,developandevaluateideasandinformationsoastoapplytheseskillstotheprojecttask.</li> <li>• Habituatedtocriticalthinkinganduseproblemsolvingskills</li> <li>• Communicateeffectivelyandtopresentideasclearlyandcoherentlyinboththewrittenandoralforms.</li> <li>• Workinateamtoachievecommongoal.</li> <li>• Learnontheirown,reflectontheirlearningandtakeappropriateactionstoimproveit.</li> </ul>			

**Continuous Internal Evaluation:**

**Project Report:** 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.

**Project Presentation:** 20 marks.

The Project Presentation marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

**Project Execution:** 50 Marks

The Project Execution marks of the Project Work Phase-II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

**Question and Answer:** 10 marks.

The students shall be evaluated based on the ability in the Question and Answer session for 10 marks.

**Semester End Examination**

SE marks for the project report (60 marks), seminar (30 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.

# SDS 2022 Syllabus