

Vision & Mission

Vision

To be known globally for value-based education, research, creativity and innovation.

Mission

- Establish state-of-the-art facilities for world class education and research.
- Collaborate with industry and society to align the curriculum,
- Involve in societal outreach programs to identify concerns and provide sustainable ethical solutions.
- Encourage life-long learning and team-based problem solving through an enabling environment.




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SCSE / DCSE / BTech / 1.1.1 / 1/12



School of Computing Science and Engineering
Department of Computer Science and Engineering

Vision:

To be recognized globally as a premier school of Computing Science and Engineering for imparting quality and value based education engaged in multi-disciplinary and collaborative research.

Mission:

M1: Developing a strong foundation in fundamentals of computer science and engineering with responsiveness towards emerging technologies.

M2: Establishing state-of-the-art facilities and adopt education 4.0 practices to analyse, develop, test and deploy sustainable ethical IT solutions by involving multiple stakeholders.

M3: Establishing Centres of Excellence for multidisciplinary collaborative research in association with industry and academia.

BTech: Curriculum Design and Development:

Curriculum design process not only take into consideration the inter-relationship amongst what will be taught, who will be taught, and how it will be taught(pedagogy) components but also the *relevance to the local/ national / regional/global developmental needs*. The school has tie-ups with both local and global industries enabling association in designing curriculum both for theory as well as lab courses. Some of the industries and their respective association with curriculum design of various courses are listed below:

Industry	Name of the course assisted for curriculum design
CISCO,Udyog Vihar Phase-IV Plot No 15 RMZ Infinity, Gurugram, Haryana 122015	1.Network Operating System 2. Network Design and Management 3. Wireless Sensor Networks 4. Computer Networks 5. Distributed Systems
MicroChip Lab, Phase 1, Plot No. 149/B, Block A, EPIP, Industrial Area, Whitefield, Bengaluru, Karnataka 560048	1. Introduction to IoT 2. IoT Security 3. Sensors and Networks



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	4. IoT Sensors
Intel CoE, UGF, Block E, International Trade Tower, Nehru Place, New Delhi, Delhi 110019	1. Data Sciences 2. Data Minig and Warehousing 3. Big Data Security 4. Predictive Analytics 5. Introduction to Big Data
Palo Alto Lab. Salarpuria Symbiosis, Arekere Village, Begur, Bannerghatta Main Rd, Venugopal Reddy Layout, Uttarahalli Hobli, Bengaluru, Karnataka 560076	1. Digital Forensics 2. Cyber Laws and Security policies 3. Cyber Security 4. E commerce
Unity Inc, Address: 2 b, unity building annexe, p kaliga rao toad,, Kalinga Rao Rd, Bengaluru, Karnataka	1. Computer Vision 2. Computer Graphics 3. Human Computer Interaction 4. Introduction to Grapics and Animation
AWS lab, Brigade Gateway, 8th floor, 26/1, Dr. Rajkumar Road, Malleshwaram(W), Bangalore-560055	1. Introduction to Cloud computing 2. Cloud Computing Security 3. Cloud Virtuliazation 4. Cloud Deploymnet models 5. Cloud Storage and Disaster recovery
VMware Lab, Brigade Gateway, 8th floor, 26/1, Dr. Rajkumar Road, Malleshwaram(W), Bangalore-560055	Introduction to Virtulization, Cloud Storage Management
Google Cloud Lab, Unit No. 204, 2nd Floor, Signature Tower-II, Tower-A, Sector-15, Part-II, Village Silokhera Gurgaon Gurgaon HR 122001 IN	1. Information Storage Management 2. Cloud Infrastructure service
UiPath RPA Lab, Prestige Falcon House, Main Guard Cross Rd, Tasker Town, Shivaji Nagar., Bengaluru, Karnataka	Robotics Process Automation, Distrubtive Computing, Predictive Learning, Open Source and Standards
Blueprism Lab, No 60, Zenith Square, R.J. Garden, Anand Nagar, Chinnapanahalli, Marathahalli Outer Ring Road, Bengaluru, Karnataka 560037	Robotics Process Automation
Oracle Academy, Embassy Business Park C V Raman Nagar Bengaluru, Karnataka 560 093	Database Management, Cloud Storage Management
Red Hat Academy, Aurangabad MIT, Red Hat Academy, Beed Bypass Road, Satara Village Road, Aurangabad, Maharashtra, 431010, India	Open source systems
Google Kotlin, Google India Pvt Ltd, 1st Floor,, 3 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra East, Mumbai, 400051, India	Mobile App development
Infosys, 3rd and 4th Floor Wing A, No. 39 (P), No. 41 (P) and No. 42 (P) Electronics City, Hosur Road Bengaluru 560 100	Industry Oriented Java and Python



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For keeping relevance with the local/global developmental needs, **PEO-survey** from stakeholders are also taken into consideration during designing of curriculum. In keeping with the vision and mission of the SCSE , the school is able to offer undergraduates programs, B.Tech (Computer Science & Engineering), under the category of Computer Engineering domain which follow fully **Choice Based Credit System (CBCS) as per UGC guidelines since the introduction of the courses** .

The development of an effective curriculum is a multi-step, ongoing and cyclical process. The process progresses from evaluating the existing program, to designing an improved program, to implementing a new program and back to evaluating the revised program. While

Curriculum is designed and developed to ensure excellence in the quality in a systematic manner which provides a learner centric education as per the following major steps:

Step-1: Program Assessment Committee (PAC) prepares the curriculum draft based on the following:

- Department Vision and Mission
- Program Educational Objectives
- Inputs collected from stakeholders as per feedback obtained-Students, Parents, Faculty and Alumni
- **Inputs from external expert academicians**
- **Program Outcomes(POs) set by National Board of Accreditation(NBA)**
- Result of Gap Analysis as performed by Internal Quality Assurance Cell(IQAC)
- Benchmarking of curriculum against same/ similar program(s) run by leading educational institutions including IITs, NITs, **National/International Universities.**
- Guidelines of AICTE/ UGC

Step-2: Considering the **local/ national / regional/global developmental needs**, Board of Studies (BoS) committee is constituted comprising following members :

- Dean of School
- Program Chairs of all programs
- At least two professors of the school
- Two(02) Associate Professor
- Student Representatives
- **Two(02-03) members as Industry representative**
- VC as Nominee

BoS meeting is conducted and curricula and the accordingly respective syllabi are finalized,

Step-3: Curricula are finally approved by the Academic Council.

Salient features:-

- Wide choice of electives/Optional additional courses
- Interdisciplinary approach.
- Program Enhance skill/employability
- Make best use of the expertise of available faculty



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The curricula are developed and reviewed by respective Boards of Studies of the SCSE under the direction of the **Program Assessment Committee (PAC)**, which comprises Head of the Department as the Chairperson, Program Chair (PC) as Coordinator for PAC, Professors, Associate Professors & Assistant Professors in the department associated with the program. The concerned Boards of studies recommend to the PAC, the introduction of new courses, prepare detailed scheme of the programs and review the syllabi from time to time and suggest modifications/ up-gradation. Feedbacks from faculty, students, alumni and the expert opinion is given due consideration. The new programs/curricula are formally approved by the Academic Council after detailed deliberations and the minutes of the meetings are duly prepared.

Academic Flexibility

Students can opt for any of the courses provided their prerequisites are met. They can also make an entry in second year if the lateral entry prerequisites are satisfied. There are provisions for integrated courses also. This enables the students to opt courses according to their interest and pace of learning. Other options available are: Interdisciplinary electives, Multidisciplinary open electives and Final year project work fully in industry.

Curriculum Enrichment

The Unique courses available are:-

- Campus to Corporate:-A personality development courses for employability.
- Foreign language courses for enabling students to become global professional
- Human values/NCC/NSS and environmental science courses for inculcating value education and environmental sensitivity necessary for holistic growth of the graduates
- Compulsory Industrial Internship for all students

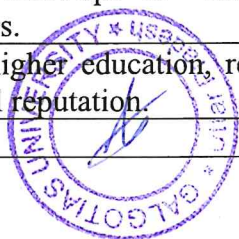
The program and corresponding courses are well defined:

PEOs, POs and PSOs of the programs are formulated/reviewed through a consultative process involving the stakeholders including students, alumni, industry, employers, faculty and staff members.

Following are the program educational objective(PEOs),Program Outcome(POs) and program specific outcome(PSO) of the program.

Program : B.Tech (Computer Science & Engineering)

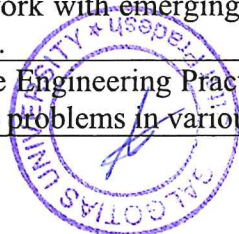
• B.Tech (Computer Science & Engineering)(SCSE101)		
Programme educational objectives(PEOs)		
1	PEO1	Be engaged with leading Global Software Services and Product development companies handling projects in cutting edge technologies
	PEO2	Engaged in technical or managerial roles at Government firms, Corporates, Start-ups or contribute to the society as successful entrepreneurs.
	PEO3	Undertake higher education, research or academia at institutions of transnational reputation.
2	Programme outcomes	



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	PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
	PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
	PO3	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.
	PO4	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
	PO5	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.
	PO6	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 practice.
	PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
	PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
	PO10	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.
	PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering 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
	PO12	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
3	Programme specifics outcome(PSO)	
	PSO1	Ability to work with emerging technologies in computing requisite to Industry 4.0.
	PSO2	Demonstrate Engineering Practice learned through industry internship to solve live problems in various domains.



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Similarly, Course Outcomes(Cos) of the courses are also formulated by the respective Boards of Studies under the direction of PAC during the introduction of the courses.

Snippets of Program-wise Cos are listed below:

Program: B.Tech (Computer Science & Engineering)(SCSE101)

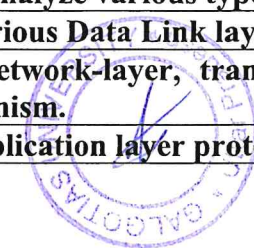
Digital Design and Computer Architecture(BCSE2310)	
CO1	Apply boolean algebra and Karnaugh Maps for simplifying digital circuits
CO2	Compare and contrast combinational and sequential circuits
CO3	Design architecture of digital systems.
CO4	Differentiate between all the design component of microarchitecture
CO5	Identify core concepts of Memory and I/O systems

Data Structures using C++(BCSE2320)	
CO1	Understand basic concepts of linear data structures
CO2	Differentiate between stack and queue data structures
CO3	Apply non-linear data structure-Tree to solve various problems
CO4	Apply non-linear data structure-Graph to solve various problems
CO5	Perform sorting and searching using various data structures

Digital Design and Computer Architecture LAB(BCSE2311)	
CO1	Understand digital logic families.
CO2	Realize minimization methods using Boolean algebra.
CO3	Design and verify experiments on combinational circuits.
CO4	Design and verify experiments on sequential circuits.
CO5	Understand SSI chip.

Data Structures using C++ LAB(BCSE2321)	
CO1	Implement searching and sorting algorithm
CO2	Implement stack and queue data structures.
CO3	Implement Tree data structures
CO4	Implement Graph data structures
CO5	Implement Dictionary functions using hashing

Data Communication and Networking(BCSE2012)	
CO1	Understand the basics of various transmission media and networks.
CO2	Compare and analyze various types of signals and conversion.
CO3	Analyze the various Data Link layer protocols and IEEE standards.
CO4	Analyze the network-layer, transport layer protocols, compression and security mechanism.
CO5	Use various application layer protocols



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Introduction to IOT, Big Data, Cloud Computing(BCSE2002)	
CO1	Describe the fundamentals of Machine to Machine Communication.
CO2	Design the architecture of reference model for IOT
CO3	List various functional groups of IOT
CO4	Apply safety and security model for IOT
CO5	List design and deployment constraints

Data Communication and Networking Lab(BCSE2052)	
CO1	Identify various transmission media used in networks.
CO2	Compare and analyze various types of signals and conversion.
CO3	Analyze the various Data Link layer protocols and IEEE standards.
CO4	Analyze the network-layer, transport layer protocols, compression and security mechanism.
CO5	Use various application layer protocols.

Introduction to Cryptographic Fundamentals(BCSE2330)	
CO1	Learn to analyse the security of the in-built cryptosystems.
CO2	Develop authentication schemes for identity and membership authorization.
CO3	Develop cryptographic algorithms for information security.
CO4	Understand the concepts of Hashing Algorithms and its application.
CO5	Identify and Analyze the applications of cryptographic Algorithms

For complete course outcomes refer to respective course book.

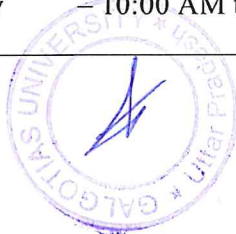


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Syllabus	
1	Course details
	Faculty name Tarun Kumar
	Programme B.Tech -CSE
	Semester III
	Section 1,4
	Course code BCSE2012
	Course title Data Communication & Networking

2	Course outcomes (COs)
	CO1 Describe Data Communication fundamentals and their uses in data-driven knowledge discovery.
	CO2 Analyze and implement several Communication learning algorithms.
	CO3 Formulate and solve Network learning problems
	CO4 Compare and Analyze different Networked learning algorithms
	CO5 Evaluate and Analyze different error control and application layer protocols.
3	List of teaching –learning pedagogy <ol style="list-style-type: none"> 1. Talk 2. Presentation 3. Flipped Class 4. Demonstration
4	Open hour for students <ul style="list-style-type: none"> ➔ Wednesday – 10:00 AM to 11:00 AM ➔ Saturday – 10:00 AM to 11:00 AM



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5	<p>Link address for course materials</p> <ol style="list-style-type: none"> 1. http://higher.ed.mheducation.com/sites/0072967757/student_view0/index.html 2. http://williamstallings.com/DCC/DCC8e.html 3. https://www.tutorialspoint.com/data_communication_computer_network/ 4. http://citengg.blogspot.com/p/behrouz-forouzancomputer-networks4th.html 5. http://www.engppt.com/2009/12/networking-fourouzan-ppt-slides.html
6	<p>Recommended list of e-books.</p> <ol style="list-style-type: none"> 1. <u>Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill Education.</u> 2. <u>William Stallings, Data and Computer Communications, Pearson, 8th Edition, 2007.</u>
7	<p>Recommended list of online courses like SWAYAM/NPTEL/MOOCs etc</p> <ol style="list-style-type: none"> 1. Coursera - https://www.coursera.org/learn/data-communication-network-services 2. Swayam - https://swayam.gov.in/courses/5782-information-and-communication-technology-for-libraries 3. NPTEL <ol style="list-style-type: none"> a. https://nptel.ac.in/courses/106106091/ b. https://nptel.ac.in/courses/106105081/ c. https://nptel.ac.in/courses/106105080/ d. https://nptel.ac.in/courses/106105183/
8	<p>Recommended list of mini projects / projects/ technical training etc.</p> <ol style="list-style-type: none"> 1. IP based Patient Monitoring System. 2. TCP Performance in an EGPRS system.
9	<p>Students' Presentation</p>



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	<ol style="list-style-type: none"> 1. Guided & Unguided Media, Protocols & Standards 2. Modulation Techniques 3. TCP Window Management 4. E-Mail
10	<p>List of e-books</p> <ol style="list-style-type: none"> 1. <u>Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill Education.</u> 2. <u>William Stallings, Data and Computer Communications, Pearson, 8th Edition, 2007.</u>
11	<p>List of NPTEL/MOOCs/SWAYAM/Courses/Video</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/106106091/ 2. https://nptel.ac.in/courses/106105081/ 3. https://nptel.ac.in/courses/106105080/ 4. https://nptel.ac.in/courses/106105183/
12	<p>List of mini projects/projects</p> <ol style="list-style-type: none"> 1. IP based Patient Monitoring System. 2. TCP Performance in an EGPRS system.

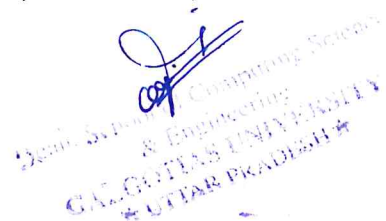
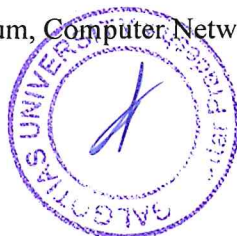
Catalog Description

This course is designed to help organizations understand Data communication in computer network and learn working of different networking protocols. Student can also have understanding about various routing protocols and how they used in different types of computer network. This course also describe basic idea about security concern in computer network.

Text Books

1. Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th edition, 2007.
2. Andrew S. Tanenbaum, Computer Networks, Pearson, Fifth Edition, 2011.

Reference Books



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1. William Stallings, Data and Computer Communications, Pearson, 8th Edition, 2007.
2. Simon Haykin, Michael Moher, Introduction to Analog and Digital Communications, Wiley Publications, Second Edition, 2007.

Course Content

Unit I: Introduction

8 lecture hours

Data and Signal fundamentals, Analog Signals, Digital Signals, Transmission Media: Guided and Unguided Media, Transmission Impairments, Categories of Networks, network topologies.

Unit II: Network Models and Protocol Suite

8 lecture hours

Protocols & Standards, OSI Model, TCP/IP Protocol Suite, Comparison of OSI and TCP/IP Model Addressing: IPv4, Physical.

Unit III: Digital Transmission and Analog Transmission

8 lecture hours

Digital Transmission: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Pulse Code Modulation, Delta Modulation, Transmission Modes.

Analog Transmission: Digital-to-Analog Conversion, ASK, FSK, PSK, Analog-to-Analog Conversion, Modulation Techniques.

Unit IV: Switching, Error Detection & Correction

8 lecture hours

Multiplexing, Switching: Circuit switched networks, Data gram networks, Virtual circuit networks, Dial up modems, DSL .Error Detection and Correction: Block coding, cyclic codes, Linear block codes, checksum.

Unit V: Data Link Control and Internet

8 lecture hours

Framing: Flow and Error Control protocols, Noisy and Noiseless channels, HDLC, Point to point protocols. WWW, HTTP, SMTP, POP3, IMAP, FTP.


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