

Program Outcomes, Program Specific Outcomes & Course Outcomes of B.Tech. CSE Program

Program Outcomes	POs of B.Tech. CSE Program
1	Adapt the changes in Artificial Intelligence based Data science and use research-based knowledge in the broadest context of technological change.
2	Having Familiarize thinking with good rational management in the field of Computer Engineering and ability to engage in continuous learning in technological areas.
3	Lightening upon predictable needs with proper contemplations such as cost-effectiveness and environmental issues.
4	Recognise the sources of information, design and compile the real time solutions using various software tools.
5	To train the individual in field of Machine Learning, cloud computing with AWS technology, Network Security, Ethical hacking and forensic security aspects.
Program Specific Outcomes	PSOs of B.Tech. CSE Program
1	Accepting the professional, technical, security, communal issues and responsibilities related to the computer field.
2	To realise the requirements of the local end users and find the best solution for complex Engineering Problems of the Sirmour area.
3	To produce interrelation and communication among the systems and have sense to equipped with innovative and efficient systems for the upward mobility of society.
4	Ability to work in team and act as an individual in a multidisciplinary environment among constituent colleges.
5	Ability to apply real time solutions in Data Analytics, Artificial Intelligence, Deep learning, Animations, Advanced network security issues and analysis ability to understand the machine behaviour and their characteristics in various domain.

Course	Course Outcomes(Cos)
B.TECH CSE 1ST SEM	
Business Communication Professional Skills (HUM101)	CO 1: To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them to listen to English spoken at normal conversational speed by educated English CO 2: To enable students face competitive exams such as, GRE, TOEFL, IELTS, UPSC and other Bank examinations CO 3: To enable them communicate their ideas relevantly and coherently in writing CO 4: Students will also exhibit advanced skills of interview, debating and discussion
Problem Solving and Programming (CSE101)	CO 1: To develop programs using the basic elements like control statements, Arrays and Strings. CO 2: To solve the memory access problems by using pointers

	<p>CO 3: To understand about the dynamic memory allocation using pointers which is essential for utilizing memory</p> <p>CO 4: To understand about the code reusability with the help of user defined functions.</p> <p>CO 5: To develop advanced applications using enumerated data types, function pointers and nested structures.</p>
Elements of Electronics Engineering (ETE103)	<p>CO 1: A remote-based work environment where client interaction, client training, operating systems, and connectivity issues are emphasized. Job titles include remote support technician, help desk technician, call center technician, IT specialist, and representative.</p> <p>CO 2: Perform a step by step assembly of a desktop computer tower.</p> <p>CO 3: Explain the purpose of preventive maintenance and identify the elements of the troubleshooting process</p>
Engineering Mathematics (EMH111)	<p>CO 1: Solve linear differential equations using Laplace transforms</p> <p>CO 2: Evaluate multiple integrals and improper integrals</p> <p>CO 3: Convert line integrals to area integrals</p> <p>CO 4: Convert surface integrals to volume integrals</p> <p>CO 5: Determine potential functions for irrotational force fields</p>
Basic Engineering Technologies Lab (EESL103)	<p>CO 1: Study and practice on machine tools and their operations</p> <p>CO 2: Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.</p> <p>CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.</p>
Engineering Physics (EPH101)	<p>CO 1: Solve engineering problems using the concepts of wave and particle nature of radiant energy</p> <p>CO 2: Understand the use of lasers as light sources for low and high energy applications</p> <p>CO 3: Understand the nature and characterization of acoustic design, nuclear accelerators and new materials</p> <p>CO 4: Apply the concepts of light in optical fibers, light wave communication systems, and holography and for sensing physical parameters</p> <p>CO 4: Understand theory of relativity and effect of oscillations</p>
Engineering Chemistry (ECH101)	<p>CO 1: The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.</p> <p>CO 2: The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.</p> <p>CO 3: The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.</p> <p>CO 4: The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.</p>
Data Communication and Networking (CSE102)	<p>CO 1: Understand the rudiments of how computers communicate</p> <p>CO 2: Be familiar with the architecture of a number of different networks.</p> <p>CO 3: Understand the principles of protocol layering.</p> <p>CO 4: Be familiar with modern communication systems.</p> <p>CO 5: Understand the basic aspects of packet-based protocol design and implementation</p>
B.TECH CSE 2ND SEM	
Numerical Analysis (EMH112)	<p>CO 1: Solve system of linear equations numerically using direct and iterative methods.</p> <p>CO 2: Understand how to approximate the functions using interpolating polynomials.</p>

	CO 3: Learn how to solve definite integrals and initial value problems numerically.
Data Structures and Algorithms (CSE103)	CO 1: Learn the program independent view of data structures, including their representation and the operations performed on them CO 2: Familiar with the utilization of the data structures in problem solving CO 3: Learn how to analyze the time and space requirements of a given algorithm
Software Engineering (CSE104)	CO 1: Gain understanding of software development life cycle CO 2: Prepare SRS document for a software project CO 3: Apply software design and development techniques CO 4: Apply estimation techniques for software development CO 5: Implement testing at each phase of SDLC
Object Oriented Programming (C++) (CSE105)	CO 1: Understand the Object oriented programming fundamentals CO 2: Develop ability to design algorithms and use functions, strings and pointers CO 3: Write computer programs to solve practical engineering problems CO 4: Design efficient computer programs to solve practical engineering problems
Human Values and Professional Ethics (EDU101)	CO 1: Students develop the capability of shaping themselves into outstanding personalities, through a value-based life. CO 2: Students turn themselves into champions of their lives. CO 3: Students take things positively, convert everything into happiness and contribute for the happiness of others. CO 4: Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in. CO 5: Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.
Environmental Studies (EVS301)	CO 1: Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. CO 2: Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales. CO 3: Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes. CO 4: Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. CO 5: Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.
IT Act & IPR (CSE106)	CO 1: The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works CO 2: During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations
Hardware Lab (CSL107)	CO 1: Identify the components of a computer, components in a CPU and its functions. Every student must draw block diagram of the CPU along with the configuration of each peripheral. CO 2: Every student should disassemble and assemble the PC back to working condition. CO 3: Every student should individually install windows 7 (professional) on the personal computer. He/she must install the device driver's software, and basic application software's viz., adobe reader, Ms-office etc. CO 4: Each student must able to configure the basic computer management settings of windows components. Each student must familiar to work with

	MS-DOS command prompt and basic DOS commands. CO 5: Every student should install operating systems on the computer.
B.TECH CSE 3RD SEM	
Operating Systems (CSE201)	CO 1: To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system. CO 2: To provide students' knowledge of memory management and deadlock handling algorithms. CO 3: Students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system.
Algorithm Analysis & Design (CSE202)	CO 1: Students will be able to argue the correctness of algorithms using inductive proofs and invariants. CO 2: Analyze worst-case running times of algorithms using asymptotic analysis. CO 3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. CO 4: Apply design principles and concepts to algorithm design
Foundations of Data Science (CSE203)	CO 1: Demonstrate understanding of basic mathematical concepts in data science, relating to linear algebra, probability, and calculus. CO 2: Employ methods related to these concepts in a variety of data science applications. CO 3: Apply logical thinking to problem-solving in context. CO 4: Demonstrate skills in writing mathematics.
Database Management Systems (CSE204)	CO 1: Master the basic concepts and appreciate the applications of database systems. CO 2: Master the basics of SQL and construct queries using SQL. CO 3: Be familiar with a commercial relational database system (Oracle) by writing SQL using the system CO 4: Be familiar with the relational database theory, and be able to write relational algebra expressions for queries
Engineering Economics and Entrepreneurship (EEE201)	CO 1: Understand major principles of economic analysis for entrepreneurship decision making among alternative courses of action in engineering. CO 2: Apply economic principles to prices and quantities in competitive supply and demand for goods and find the cost estimation. CO 3: Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis
Computer Graphics & Multimedia (CSE205)	CO 1: Provide comprehensive introduction about computer graphics system and design algorithms CO 2: Familiar with two dimensional and three dimensional transformations CO 3: Familiar with techniques of clipping, hidden surface removal and shading CO 4: Provide information about Multimedia and data compression techniques
B.TECH CSE 4TH SEM	
Artificial Intelligence (CSE206)	CO 1: Students will be able to identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem. CO 2: Formalise a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc). CO 3: Implement basic AI algorithms (e.g., standard search or constraint propagation algorithms). CO 4: Design and perform an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

Computer Organization & Architecture (CSE207)	CO 1: Understanding Logic gates, flip flops and counter, Clear Understanding of Computer Architecture, Pipeline processing, RISC and CISC architectures, CO 2: Develop a base for advance micro-processors.
Data Mining & Warehousing (CSE208)	CO 1: Design a data mart or data warehouse for any organization CO 2: Extract knowledge using data mining techniques CO 3: Adapt to new data mining tools. CO 4: Explore recent trends in data mining such as web mining, spatial-temporal mining
Computer Networks (CSE209)	CO 1: Students will be able to implement the terminology and concepts of the OSI reference model and the TCP-IP reference model. CO 2: To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks. CO 3: To be familiar with wireless networking concepts. CO 4: To be familiar with contemporary issues in networking technologies. CO 5: To be familiar with network tools and network programming
Statistical Foundations for Data Science (CSE210)	CO 1: Demonstrate understanding of basic mathematical concepts in data science, relating to linear algebra, probability, and calculus. CO 2: Employ methods related to these concepts in a variety of data science applications. CO 3: Apply logical thinking to problem-solving in context. CO 4: Demonstrate skills in writing mathematics
System Software (CSE211)	CO 1: Understand the architecture of various machines CO 2: Implement of Single Pass and Two Pass Assembler CO 3: Implement of Absolute Loader and Text Editor
B.TECH CSE 5TH SEM	
Web Technologies (CSE301)	CO 1: Understanding of Web fundamentals and its working around the world CO 2: Understanding and Web Development skills using different flavours of HTML along with CSS technology and interactive validations of different elements using JavaScript/ vbscript CO 3: Understanding E-commerce market and being aware of prime security issues while developing applications CO 4: Understanding the programming skills using java as Internet programming tool, developing client-server applications, Swings & Events Exception Handling, Servlet and JDBC applications
Discrete Structure (CSE302)	CO 1: Be able to construct simple mathematical proofs and possess the ability to verify them CO 2: Have substantial experience to comprehend formal logical argument CO 3: Be skilful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic
Compiler Design (CSE303)	CO 1: Design and implement a prototype compiler. CO 2: Apply the various optimization techniques. CO 3: Use the different compiler construction tools.
Network Programming (CSE304)	CO 1: Learn basics and advanced techniques of socket based client server programming CO 2: Identify and apply various socket programming concepts and mechanisms CO 3: Gain depth knowledge of sockets and the system calls needed to support network programming CO 4: Effectively use the socket interface to develop Client-Server Internet applications
Simulation and Modelling (CSE305)	CO 1: Analyze the system and its behaviour so that the physical behaviour of a system can transform into a mathematical model that can in turn transform into an efficient algorithm for simulation purpose. CO 2: Understand the methodology for modelling & simulation of

	<p>continuous, discrete and combined systems using simulation languages</p> <p>CO 3: Have basic knowledge on simulation software and use it in solving of engineering problems, analysis and validation of the results</p> <p>CO 4: Understand how simulation modelling can aid in effective decision-making.</p>
B.TECH CSE 6TH SEM	
Automata and Formal Languages (CSE307)	<p>CO 1: Students will analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.</p> <p>CO 2: Students will demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.</p> <p>CO 3: Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages</p> <p>CO 4: Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.</p> <p>CO 5: Students will learn that certain problems do not admit efficient algorithms, and identify such problems.</p>
Software Reliability & Testing (CSE308)	<p>CO 1: Understand the concept of reliability and access the difference between H/W & S/W reliability and evaluate different S/W engineering technologies</p> <p>CO 2: Understand and anticipate the possible causes of failure and knowledge of how to prevent them and know about various parameter determination methods</p> <p>CO 3: Analyze and test a S/W system, when it is evolved to accommodate a set of change requirements such as adding new functionalities, bug fixing etc</p>
Machine Learning (CSE309)	<p>CO 1: Understand the concepts of computational intelligence like machine learning</p> <p>CO 2: Ability to get the skill to apply machine learning techniques to address the real time problems in different areas</p> <p>CO 3: Understand the Neural Networks and its usage in machine learning application.</p>
Java Programming (CSE310)	<p>CO 1: To gain knowledge of the structure and model of the Java programming language.</p> <p>CO 2: Students will be able to use the Java programming language for various programming technologies.</p> <p>CO 3: To develop software in the Java programming language.</p> <p>CO 4: Students will evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.</p> <p>CO 5: To propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.</p>
Natural Language Processing (CSE311)	<p>CO 1: Understand the approaches to syntax and semantics in Natural Language Processing, the various types of language processors, and the computational morphology</p> <p>CO 2: Understand the basic parsing strategies and the approaches to ambiguity resolution</p> <p>CO 3: Apply the fundamental algorithms and techniques in the area of Natural Language Processing</p>
Pattern Recognition (CSE312)	<p>CO 1: Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.</p> <p>CO 2: Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.</p> <p>CO 3: Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.</p> <p>CO 4: Apply pattern recognition techniques to real-world problems such as document analysis and recognition.</p> <p>CO 5: Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.</p>

Digital Image Processing (CSE313)	<p>CO 1: Review the fundamental concepts of a digital image processing system.</p> <p>CO 2: Analyze images in the frequency domain using various transforms.</p> <p>CO 3: Evaluate the techniques for image enhancement and image restoration.</p> <p>CO 4: Categorize various compression techniques.</p>
Cloud Computing (CSE314)	<p>CO 1: Understand the fundamental principles of distributed computing. Understand how the distributed computing environments known as Grids can be built from lower level services.</p> <p>CO 2: Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.</p> <p>CO 3: Analyze the performance of Cloud Computing.</p>
Distributed Systems (CSE315)	<p>CO 1: Students will identify the core concepts of distributed systems: the way in which several machines orchestrate to correctly solve problems in an efficient, reliable and scalable way.</p> <p>CO 2: Students will examine how existing systems have applied the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems</p>
Linux Programming (CSE316)	<p>CO 1: Understanding the basic set of commands and utilities in Linux/UNIX systems.</p> <p>CO 2: Students will learn to develop software for Linux/UNIX systems.</p> <p>CO 3: To learn the C language and get experience programming in C.</p> <p>CO 4: To learn the important Linux/UNIX library functions and system calls.</p> <p>CO 5: To understand the inner workings of UNIX-like operating systems</p>
Data or Information Cryptography (CSE317)	<p>CO 1: Provide security of the data over the network.</p> <p>CO 2: Do research in the emerging areas of cryptography and network security.</p> <p>CO 3: Implement various networking protocols.</p> <p>CO 4: 4. Protect any network from the threats in the world</p>
Security in Computing (CSE318)	<p>CO 1: Provide security of the data over the network.</p> <p>CO 2: Do research in the emerging areas of cryptography and network security.</p> <p>CO 3: Implement various networking protocols.</p> <p>CO 4: Protect any network from the threats.</p>
Computer Forensics & Digital Evidence (CSE319)	<p>CO 1: Students are able to demonstrate critical thinking by analyzing situations and by constructing and selecting solutions to problems.</p> <p>CO 2: able to understand and appreciate the legal and ethical environment impacting individuals as well as business organizations and have an understanding of the ethical implications of IT legal decisions.</p> <p>CO 3: able to understand fundamentals and advanced issues of various threats faced by today's cyber infrastructure.</p>
Mobile Communication Systems (CSE320)	<p>CO 1: To make students familiar with various generations of mobile communications</p> <p>CO 2: To understand the concept of cellular communication</p> <p>CO 3: To understand the basics of wireless communication</p> <p>CO 4: Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.</p>
Semantic Web (CSE321)	<p>CO 1: Discuss about basic of semantic web and search engine</p> <p>CO 2: Explain RDFS and its process</p> <p>CO 3: Explain semantic issue and prototype system</p> <p>CO 4: Explain various semantic web services and its design</p>

Neural Networks (CSE322)	<p>CO 1:Ability to understand the concepts of Neural Networks</p> <p>CO 2:Ability to select the Learning Networks in modeling real world systems</p> <p>CO 3:Ability to use an efficient algorithm for Deep Models</p> <p>CO 4:Ability to apply optimization strategies for large scale applications</p>
Soft Computing (CSE323)	<p>CO 1:To understand the fundamental theory and concepts of N networks, Identify different neural network architectures, algorithms, applications and their limitations</p> <p>CO 2:Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications</p> <p>CO 3:Reveal different applications of these models to solve engineering and other problem</p>
Information Retrieval (CSE324)	<p>CO 1:gain an understanding of the basic concepts and techniques in Information Retrieval;</p> <p>CO 2:understand how statistical models of text can be used to solve problems in IR, with a focus on how the vector-space model and language models are implemented and applied to document retrieval problems;</p> <p>CO 3:understand how statistical models of text can be used for other IR applications, for example clustering and news aggregation;</p> <p>CO 4:appreciate the importance of data structures, such as an index, to allow efficient access to the information in large bodies of text;</p>
Intrusion Detection (CSE325)	<p>CO 1: Explain the fundamental concepts of Network Protocol Analysis and demonstrate the skill to capture and analyze network packets.</p> <p>CO 2: Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks and troubleshoot network problems.</p>
Ad-Hoc & Sensor Networks (CSE326)	<p>CO 1:Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks</p> <p>CO 2: Ability to solve the issues in real-time application development based on ASN.</p> <p>CO 3: Ability to conduct further research in the domain of ASN</p>
B.TECH CSE 7TH SEM	
Intro to Competitive Programming (CSE401)	<p>CO 1: describe how algorithmic problems are solved.</p> <p>CO 2: recognize the time and memory complexity of an algorithm or a structure.</p> <p>CO 3: explain the concrete algorithms and data structures.</p> <p>CO 4: analyze the given problem and recognize subproblems.</p> <p>CO 5: apply the knowledge on a wider set of problems.</p>
Mobile App Development (CSE402)	<p>CO 1: Recognizes the concept of application development for mobile devices.</p> <p>CO 2:Recognizes mobile computing platforms and mobile computing</p> <p>CO 3:Recognizes smart devices</p> <p>CO 4: Recognizes mobile development environments.</p> <p>CO 5: Explains the basic concepts of Android phone features and capabilities.</p>
Pega- A Digital Transformation Software Paradigm (CSE403)	<p>CO 1: Understand the BPM concepts and workflows.</p> <p>CO 2: Providing good knowledge of Pega concepts.</p> <p>CO 3: Providing instructions for implementation of Pega concepts.</p> <p>CO 4: Instructions to implement the BPM application.</p> <p>CO 5: Implement web application with Pega application.</p>
Introduction to Animation & Gaming (CSE404)	<p>CO 1: Recognize and evaluate critical and aesthetic issues within computer graphics and the mixed media. (Issues)</p> <p>CO 2: Apply aesthetic judgments and critical thinking skills to art and graphics related issues. (Aesthetics)</p>

	<p>CO 3: Demonstrate mastery of specific technical, conceptual and critical abilities within computer graphics and the mixed media. (Abilities)</p> <p>CO 4: Demonstrate proficiency with industrial applications to visual communication related technologies.</p>
<p>Cloud Computing with AWS (CSE405)</p>	<p>CO 1: Make architectural decisions based on the AWS recommended architectural principles and best practices</p> <p>CO 2: Utilise AWS services to make your infrastructure scalable, reliable, and highly available</p> <p>CO 3: Make an AWS-based infrastructure more efficient to increase performance and reduce costs</p> <p>CO 4: Use the Well-Architected Framework to improve architectures with AWS solutions</p>