DEPARTMENT OF COMPUTER SCIENCE

Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited by NAAC
Pollachi-642001

SYLLABUS

B. Sc. COMPUTER SCIENCE
BATCH 2022-2025

NGM COLLEGE

Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

DEPARTMENT OF COMPUTER SCIENCE

Department Vision

Our vision is to make the department, a department of excellence at the international level by imparting need based Information Technology education of global industry standards to make students academically and technically sound, enriched with rich spiritual quotients, contribute to the overall development of the self, societyand country.

Department Mission

Developing students to become role models as technocrats by imparting technical knowledge, recent curriculum in catering the needs of Information Technology industry and quality education through dedicated faculty and rejuvenate students into technically sound, in order to make globally fit and improve the standard of life.

Programme Educational Objectives (PEOs)	
The **B. Sc. Computer Science** programme describe accomplishments that graduatesare expected to attain within five to seven years after graduation	
PEO1	To enrich knowledge in core areas related to the field of computer science and Mathematics.
PEO2	To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0 tools and techniques and there by design and implement software projects to meet customer's business objectives.
PEO3	To enable graduates to pursue higher education leading to Master and Research Degrees or have a successful career in industries associated with Computer Science or as entrepreneurs
PEO4	To enhance communicative skills and inculcate team spirit through professional activities, skills in handling complex problems in data analysis and research project to make them a better team player.
PEO5	To embed human values and professional ethics in the young minds andcontribute towards nation building.

Programme Outcomes (POs)	
On successful completion of the B.Sc. **Computer Science** program	
PO1	**Problem Solving:** Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
PO2	**Disciplinary Knowledge:** Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation.
PO3	**Scientific reasoning/ Problem analysis:** Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
PO5	**Modern tool usage:** Use contemporary techniques, skills and digital tools necessary for integrated solutions.
PO6	**Design Development Solution:** Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate
PO7	**Team Work :** Ability to operate as a member, leader and manage, deploy, Configure computer network, hardware, software operation of an organization
PO8	**Communication Skills:** An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups
PO9	**Emerging Technology Usage:** Ability to appreciate emerging technologies and tools.
PO10	**Decision Making :** Ability to apply decision making methodologies to evaluate solution for efficiency, effectiveness, and sustainability

Programme Specific Outcomes (PSOs)	
After the successful completion of **B.Sc. Computer Science** program, the students are expected to	
PSO1	**Software Development:** Design and develop computer programs/computer -based systems Development in the areas related to algorithms, languages, networking, web development cloud computing, IoT and data analytics.
PSO2	**Education and Employment :** Ability to pursue higher studies of specialization and totake up technical employment

MAPPING OF PEOs WITH POs 2 PSOs

PEOs / POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	M	M	L	L
PO2	M	M	H	L	L
PO3	M	H	M	H	L
PO4	M	H	M	L	L
PO5	M	H	H	H	M
PO6	M	H	H	H	L
PO7	H	M	H	H	M
PO8	M	H	H	H	M
PO9	H	H	M	H	L
PO10	H	H	H	M	L
PSO1	H	H	H	M	L
PSO2	H	M	H	H	M

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS101			**Title**	**Batch:**	2022 - 2025
				Core I:	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	3	C Programming	**Credits:**	3

Course Objective

The course objective is to know the basic components of the computer and working of each device, the student gain experience about structured programming, understand the implementation of C language and understand various features in C.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To keep in mind the fundamentals of C programming	K1
CO2	To understand the loops and decision making statements to solve the problem	K2
CO3	To implement different operations on arrays and use functions to solve the given problem.	K3
CO4	To review the C program that uses pointers, structures and files	K4
CO5	To understand and evaluate File Concept	K2,K5

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	L	L	H	L	L	M	M	H	H
CO2	H	H	H	L	L	H	M	M	H	M	H	H
CO3	H	M	H	L	M	M	L	L	H	L	M	H
CO4	H	M	H	L	M	M	L	M	H	L	M	H
CO5	H	H	H	L	M	H	M	M	H	M	H	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS102			**Title**	**Batch:**	2022 – 2025
				Core II: Digital Computer Fundamentals and Organization	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	04

Course Objective

On completion of this course, the students can understand the design of combinational and sequential digital logic circuits. Students will also have knowledge on Programmable Logic devices and its usage.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To recollect the fundamental concepts and techniques used in digital electronics.	K1
CO2	To get the idea of basic postulates of Boolean Algebra and to apply the methods of simplifying Boolean expressions	K2
CO3	To apply knowledge about internal circuitry and logic behind any digital system and to design various synchronous and asynchronous circuits.	K3
CO4	To identify the concept of memories, and to introduce microcontroller case study.	K4
CO5	To analyze the usage of different kinds of Memory Management and mapping techniques	K5

Mapping

PO\CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	M	M	M	H	H	M	M	M	M	M
CO2	H	H	H	H	H	H	H	M	M	H	H	H
CO3	H	M	H	M	H	H	M	M	H	H	H	H
CO4	H	M	H	M	M	H	H	H	H	H	M	H
CO5	H	H	M	M	H	H	H	H	M	H	H	H

H- High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS1A1			**Title**	**Batch:**	2022 - 2025
				Allied-1: Mathematics(Statistical Methods & Linear Algebra)	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	5		**Credits:**	4

Course Objective

- To apply the computational aspects of basic statistical measures and to enable the students to solve linear system of equations and integration using numerical methods.
- To present the concept of theoretical probability to acquaint the knowledge of testing of small and large samples which plays an important role in real life problems

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand the definition of matrix and determinants and apply various operations on it	K3
CO2	Understand the statistical formula and apply them in various data analysis	K3
CO3	Understand the concept of most powerful test and analyze the samples based onmost powerful test like‘t’ and ‘F’ distributions	K4
CO4	Understand the concepts of probability and apply to solve real life situations	K3
CO5	Obtain numerical solutions of algebraic equations and compute the integrals by using the appropriate technique	K4

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	M	M	H	L	H	M	L	L	L	M	H	M
CO2	H	M	H	L	H	M	M	M	M	H	H	M
CO3	M	M	H	L	H	M	M	M	M	H	H	M
CO4	H	M	H	L	H	H	H	M	H	H	H	H
CO5	M	M	H	L	H	H	L	M	M	M	H	H

H-High; M-Medium; L-Low

Level II

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	21UCS1A2			**Title**	**Batch:**	2022 - 2025
				Allied-1: Advanced Mathematics and Applied Statistics	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	4

Course Objective

- To apply the computational aspects of basic statistical measures and to enable the students to solve linear system of equations and integration using numerical methods.
- To present the concept of theoretical probability to acquaint the knowledge of testing of small and large samples which plays an important role in real life problems

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand and analyze the statistical formula and apply them in various data analysis problems and Measure and interpret the degree of relationship between variables.	K4,K2
CO2	Apply the distributions to infer the behavior of observation in the sample spaceandalso learn its moment generating function	K4
CO3	Analyze the concept of most powerful test and analyze the samples based onmost powerful test like_t‘, _F‘ and chi-square	K4
CO4	Understand the concepts of probability and apply to solve real life situations	K3,K2
CO5	Evaluate numerical solutions of algebraic equations and compute the integrals by using the appropriate technique	K5

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	M	H	H	M	H	H	H	M	H
CO2	H	M	H	M	H	H	M	H	H	H	M	H
CO3	M	H	H	L	H	H	M	H	H	H	L	H
CO4	H	H	H	M	H	H	H	H	H	H	M	H
CO5	M	M	H	L	M	H	M	M	M	M	L	M

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS103			**Title :**	**Batch :**	2022-2025
				Core Lab III: Programming Lab in C	**Semester:**	I
Hrs/Week:	5	**Tutorial Hrs./Sem.**	-		**Credits:**	02

Course Objective

The purpose of this course is to introduce students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes (CO)

CO1	To implement different operations on arrays and use functions to solve the given problems.	K3
CO2	To evaluate the C program that uses pointers, structures and files	K4
CO3	To validate programs with pointers and arrays, perform pointer arithmetic, and use the pre processor	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**
CO2	**H**	**M**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO3	**M**	**M**	**H**	**H**	**M**	**H**	**H**	**M**	**H**	**H**	**H**	**H**

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS204			**Title :**	**Batch :**	2022-2025
				Core III: C++ Programming	**Semester:**	II
Lecture Hrs/Week:	4	**Tutorial Hrs./Sem.**	-		**Credits:**	03

Course Objective

On successful completion of the course the students should understand all the features of C++ and make the students to apply the same for writing programming for solving problem

Course Outcomes (CO)

CO1	To remember the basic OOPs concepts such as Class, Inheritance, Abstraction, Polymorphism etc.	K1, K2
CO2	To understand how C++ differentiates between object oriented programming and procedural programming and the use of function, operator overloading.	K2 K4
CO3	To apply contructor & Destructors in performing and Built programme using virtual functions.	K3
CO4	To implement programs using more advanced features such as composition of Objects, Operator overloads, Inheritance, Polymorphism, Dynamic memory allocation etc.	K3
CO5	To evaluate C++ programs using File I/O, Command line Arguments and Exception Handling.	K4

POs / **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	M	H	L	H	M	M	H	M	H
CO2	H	M	H	M	M	L	M	M	M	M	M	M
CO3	H	H	H	H	H	M	H	H	H	M	H	H
CO4	H	H	M	M	H	M	M	H	M	L	M	H
CO5	H	M	H	M	M	L	M	M	M	M	M	M

H-High; M-Medium; L-Low

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	22UCS205			Title:	Batch :	2022-2025
				Core IV: Data and File Structure	Semester:	II
Lecture Hrs/Week:	4	Tutorial Hrs./Sem.	4		Credits:	04

Course Objective

On successful completion of the course the students are able to understandthe concepts of array, stack, queue, list, linked list, tree, graph theory, searching and sorting.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To keep in mind the basic static and dynamic data structures and relevant standard algorithms for them.	K1
CO2	To get the idea about advantages and disadvantages of specific algorithms and data structures.	K2
CO3	To implement new solutions for programming problems or improve existing code using learned algorithms and data structures.	K3
CO4	To evaluate algorithms and data structures in terms of time and memory complexity of basic operations.	K5
CO5	To analyze storage device types and indexing techniques	K4

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	M	H	H	M	H	M	H	H
CO2	H	M	H	H	H	H	M	H	H	H	H	M
CO3	M	H	H	H	H	M	M	M	H	H	M	H
CO4	M	H	M	H	H	M	H	M	H	H	M	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS2A1	**Title:**	**Batch :**	2022-2025
		Allied-2: Discrete Mathematics Level-I	**Semester**	II
Hrs/Week:	4		**Credits:**	4

Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, fuzzy sets, partial ordering, algebraic structures, mathematical logic, and formal languages and graph theory

Course Outcomes (CO)

CO1	To keep in mind about the fundamental ideas and notation of discrete mathematics with examples	K1
CO2	To Understand and evaluate the concepts of Relations	K2, K5
CO3	To get the idea of relations and its types and fuzzy sets and its operations	K2
CO4	To analyze the formal language such as formation of words with examples ,groups and monoids	K4
CO5	To Understand and apply basic properties of graphs and types of graphs, and be able to relate these to practical examples	K2, K3

MAPPING

POs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P1O**	**PSO1**	**PSO2**
CO1	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**L**	**M**	**M**	**H**	**M**
CO2	**H**	**H**	**H**	**H**	**M**	**L**	**H**	**M**	**M**	**H**	**H**	**H**
CO3	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**M**	**M**	**H**	**H**	**M**
CO4	**H**	**M**	**H**	**H**	**H**	**M**	**M**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**M**	**H**	**H**	**H**	**M**	**M**	**H**	**H**	**H**	**H**	**H**

H: High M: Medium L: Low

Programme Code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	22UCS2A2	Title:	Batch :	2022-2025
		Allied-2: Discrete Mathematical Structure Level-II	Semester	II
Hrs/Week:	4		Credits:	4

Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, set theory, partial ordering, mathematical logic, and formal languages and graph theory and trees.

CO1	To understand and analyze Algebraic Laws and Set theory Concepts.	K2, K4
CO2	To keep in mind about the fundamental ideas and notation of discrete mathematics with examples	K1
CO3	To get the idea of relations, types of relations and functions, types of functions	K3
CO4	To analyze the formal language such as formation of words and monoids with examples	K4
CO5	To understand basic properties of graphs, compare the types of graphs and evaluate these with practical examples	K2, K5

Course Outcomes (CO)

MAPPING

POs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P1O**	**PSO1**	**PSO2**
CO1	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**L**	**M**	**M**	**H**	**M**
CO2	**H**	**H**	**M**	**H**	**M**	**L**	**H**	**H**	**M**	**H**	**M**	**H**
CO3	**H**	**M**	**H**	**M**	**H**	**H**	**M**	**H**	**M**	**H**	**H**	**M**
CO4	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**H**	**H**	**H**	**H**	**M**
CO5	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**H**	**H**	**H**	**H**	**M**

H: High M: Medium L: Low

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	22UCS206			Title :	Batch :	2022-2025
				Core Lab II: Programming Lab in C++	Semester:	II
Hrs/Week:	4	Tutorial Hrs./Sem.	-		Credits:	02

Course Objective

The primary aim of C++ programming was to add object orientation to the C programming language and also to enhance problem solving and programming skills using OOPs concepts in various domains.

Course Outcomes (CO)

CO1	To apply the basic concepts of C++ such as function, friend functions and array of objects to solve a particular problem.	K3
CO2	To analyze programs using more advanced OOPs concepts such as Constructor/Destructor, Operator overloading, Inheritance, and Polymorphism.	K4
CO3	To validate programs using Dynamic memory allocation and Virtual functions.	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**M**	**M**	**L**	**H**	**M**
CO2	**H**	**H**	**M**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**M**	**H**
CO3	**M**	**M**	**H**	**H**	**M**	**M**	**H**	**M**	**M**	**L**	**H**	**H**

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS307			**Title**	**Batch:**	2023 - 2026
				CC V: Java Programming	**Semester:**	III
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	4

Course Objective

The objective of this course is to make the students to understand the various features of Java such as Packages, Applets, AWT controls, Stream classes and Files and make the students to apply the same for writing the programs.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember and understand the OOPs concepts such as class, methods, inheritance, encapsulation and polymorphism etc.	K1, K2
CO2	To understand the differences between application programs and applets, applet life cycle and graphics programming.	K2
CO3	To implement programs using Thread, Applet and AWT controls, Swings, Beans and Servlets	K3
CO4	To evaluate java programs using stream classes and files.	K4
CO5	To design webpage using Applets	K5

Mapping

POs / **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	M	H	L	H	M	M	H	M	H
CO2	M	M	M	M	M	L	M	M	M	M	M	M
CO3	M	M	H	H	H	M	H	H	H	M	H	H
CO4	H	H	M	M	H	M	M	H	M	L	M	H
CO5	H	M	H	M	M	L	M	M	M	M	M	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**ProgrammeTitle:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS308			**Title**	**Batch:**	2023 - 2026
				CC VI: Operating System Concepts and Linux	**Semester:**	III
Lecture Hrs./Week	5	**Tutorial Hrs./Sem**	-		**Credits:**	4

Course Objective

Understand the fundamental concepts of operating systems, including process management, memory management, and virtual storage management and also learn about the different storage management strategies, job and processor scheduling algorithms

Understand the basics of Linux, including the GNU Project and the Free Software Foundation, shell programming, and Linux commands and Gain knowledge of processes, threads, and interprocess communication and file system permissions.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Develop a solid understanding of operating system fundamentals, including process concepts, process states and transitions, operations on processes, interrupt processing, and real storage management strategies	K1
CO2	Understands the use of different process scheduling algorithm and virtual storage techniques	K2
CO3	Apply the concept of Disk Performance Optimization to improve system performance and can be effectively navigate and utilize the Linux environment for various tasks.	K3
CO4	Design, develop, and manage processes and threads, enable to build robust and efficient software systems.	K4
CO5	Evaluate the different methods of interprocess communication and implement secure communication and access control mechanisms in software systems.	K5

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H
CO4	H	H	M	H	M	M	M	M	L	M	H	M
CO5	M	M	M	H	M	H	M	L	M	M	H	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS3A1			**Title :**	**Batch :**	2023-2026
				GE III – Allied III: Computer Based Optimization Techniques	**Semester:**	III
Lecture Hrs/Week:	5	Tutorial Hrs/Sem.	-		**Credits:**	4

Course Objective

To enable the students to understand and to apply the resource management techniques available in OR including linear programming transportation assignment problem, inventory control, queuing theory and network problems.

Course Outcomes (CO)

On the successful completion of the course, students will beable to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Remember and understand the concepts of relations	K1,K2
CO2	Understand the concept of transportation, networking, replacement, etc.,	K2
CO3	Apply the appropriate optimization techniques to solve the computer based business problems	K3,K5
CO4	Become familiar with, LPP, Hungarian method, Game theory, Replacement problem.	K4,K5
CO5	Analyze the ability of critical thinking, to find shortest time duration	K5

Mapping

POs / **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P1O**	**PSO1**	**PSO2**
CO1	H	H	H	M	M	H	H	M	M	M	M	H
CO2	H	M	H	H	H	M	M	M	M	H	H	M
CO3	M	H	H	M	M	M	M	M	M	H	M	M
CO4	H	H	H	H	M	H	M	M	M	M	M	H
CO5	H	H	H	H	M	M	M	H	M	M	M	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS3A2			**Title:**	**Batch:**	2023-2026
				GE III – Allied III: Resource Management Techniques	**Semester:**	III
Lecture Hrs/Week:	5	Tutorial Hrs/Sem.	-		**Credits:**	4

Course Objective

To enhance the students' knowledge in decision analysis, sequencing of the jobs to be carried out based on cost optimization, replacement policies and analyze the cases according to their categories.

Course Outcomes(CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the principles and applications of information theory	K1,K2
CO2	To understand sequencing, replacement problems.	K2
CO3	Demonstrate skills to achieve their objective using sequencing models.	K3,K5
CO4	Apply decision making under different business environments.	K4,K5
CO5	Determine a solution to a rectangular game using simplex method	K5

Mapping

POs / **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P1O**	**PSO1**	**PSO2**
CO1	H	H	H	M	M	H	H	M	M	M	M	H
CO2	H	M	H	H	H	M	M	M	M	H	H	M
CO3	M	H	H	M	M	M	M	M	M	H	M	M
CO4	H	H	H	H	M	H	M	M	M	M	M	H
CO5	H	H	H	H	M	M	M	H	M	M	M	M

H-High; M-Medium; L-Low

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS309	**Title :**	**Batch :**	2023-2026
		CC Lab III: Programming Labin Java	**Semester:**	III
Hrs/Week:	4		**Credits:**	2

Course Objective

The objective of this course is to make the students to implement various features of Java programming by using Java SDK environment to create, debug and run Java programs.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To apply the basic concepts of Java such as class, methods, constructors, arrays and interfaces to solve the problems.	K3
CO2	To analyze programs using method overloading, methodoverriding, packages and threads.	K4
CO3	To validate programs using event handling, applets, AWT controls andfiles.	K5

Mapping

POs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	M	M	M	H	H	H	L	M	M
CO2	H	H	M	M	H	H	H	M	M	L	M	H
CO3	H	H	M	M	M	M	H	H	H	H	M	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS310			**Title**	**Batch:**	2023 - 2026
				CC Lab IV: Programming Lab in Linux	**Semester:**	III
Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

The objective of this course is to make effective use of Linux utilities and shell scripting language to solve problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Develop shell scripts for simple applications.	K3, K4, K5
CO2	To Develop programs to create and manage processes.	K3, K4, K5
CO3	To Develop programs for system administration	K3, K4, K5

Mapping

POs, PSOS / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	L	L	H	H	M	L	M	H	H	H
CO2	H	H	L	L	H	H	H	L	M	H	H	H
CO3	H	H	L	L	H	H	H	L	M	H	H	H

H-High; M-Medium; L-Low

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS3N1	**Title :**	**Batch :**	2023-2026
		Non-Major Elective Paper-I: Photoshop Lab	**Semester:**	III
Hrs/Week:	1		**Credits:**	2

Course Objective

The objective of this course is to make the students to gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the toolbar, layers, and the adjustments panel.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO3	To Identify the basic tools and components of multimedia components.	K5

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS3N2	**Title :**	**Batch :**	2023-2026
		Non-Major Elective Paper-I: Advanced Applications in MSExcel Lab	**Semester:**	III
Hrs/Week:	1		**Credits:**	2

Course Objective

This course was designed for the intermediate student who has already mastered the basic skills andwants to gain more advanced skills to put to work in a business environment or for personal use.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO5	To Identify the basic tools and components of multimedia components	K5

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS411			**Title**	**Batch:**	2023 - 2026
				CC VII: Python Programming	**Semester:**	IV
Lecture Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	3

Course Objective

On successful completion of this course the students should understand the core principles of the Python Language and use the tools to produce well designed programs in python and create effective GUI applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the principles of structured programming and to understand basics of python.	K1
CO2	To understand the common programming idioms: variables, loop, branch, subroutine and input/output	K2
CO3	To deploy the concepts of functions, standard libraries,modular programming and the design of user interfaces	K3
CO4	To figure out ability to analyze and solve the problems usingadvanced facilities of the Python Language	K4
CO5	To evaluate the object oriented features in python using functions and standard libraries.	K5

Mapping

PO /PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	M	L	H	H	M	H	H
CO2	H	M	H	H	H	L	L	H	L	H	M	H
CO3	H	H	H	H	M	M	M	M	M	H	H	H
CO4	M	H	M	M	H	L	L	L	L	M	H	M
CO5	H	H	M	H	M	M	M	M	M	H	H	M

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS412			**Title:**	**Batch :**	2023-2026
				CC VIII: Relational Database Management Systems	**Semester:**	IV
Lecture Hrs/Week:	4	**Tutorial Hrs./ Sem.**	-		**Credits:**	3

Course Objective

The objective of this course is to make the students to understand and apply the principles of data modeling using Entity Relationship and normalization techniques and understand the use of Structured Query Language (SQL) and its syntax.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic concepts and applications of database systems and SQL.	K1
CO2	To understand the relational database theory, and be able to write relational algebra expressions for queries	K2
CO3	To apply design principles using the E-R method and normalization approach	K3
CO4	To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors.	K4
CO5	To attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H
CO4	H	H	M	H	M	M	M	M	L	M	H	M
CO5	M	M	M	H	M	H	M	L	M	M	H	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS413			**Title**	**Batch:**	2023 -2026
				CC Lab V: Programming Lab in Python	**Semester:**	IV
Practical Hrs./Week	4	**Pratical Hrs./Sem.**	-		**Credits:**	2

Course Objective

On successful completion of the course the students should write well-documented programs in the Python language, including use of the logical constructs of that language.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To implement, Interpret, Contrast of various operators.	K3
CO2	To review and analyze database with variables, loop,branch, subroutine, and input/output.	K4
CO3	To validate how databases are integrated with components, modular programming and the design of user interfaces.	K5

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS414			**Title**	**Batch:**	2023 - 2026
				CC Lab VI: Programming Lab in RDBMS	**Semester:**	IV
Practical Hrs./Week	3	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

The objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to theparticipants to groom them into well-informed database application developers.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the normalization techniques for development of application software to realisticproblems and ability to formulate queries using SQL DML/DDL/DCL commands	K3
CO2	To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors.	K4
CO3	To access data stored in an Oracle Relational DBMS using Oracle SQL, PL/SQL	K5

Mapping

PO/ CO	PO1	PO2	PS3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS4S1	**Title :**	**Batch :**	2023-2026
		SEC I: Naan Mudhalvan: Industry 4.0	**Semester:**	IV
Hrs/Week:	2		**Credits:**	2

Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of augmented reality in Industry 4.0 with real-time	K1
CO2	To impart the importance of AI technologies in assistive technology	K2
CO3	To discuss the available applications of AI for promoting early diagnosis of diseases	K3
CO4	To understand the various AI technologies	K4
CO5	To provide Big Data scope into different application areas	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS4S2	**Title :**	**Batch :**	2023-2026
		SEC I: Naan Mudhalvan: Aptitude for Placements	**Semester:**	IV
Hrs/Week:	2		**Credits:**	2

Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic mathematics and its functions.	K1
CO2	To understand the various problems in the real world related to shapes, purchase, sales, interest.	K2
CO3	To apply the skills required for various problems.	K3
CO4	To analyze the illustration and steps involved in problem solving approach.	K4
CO5	To build the quantitative aptitude skills for solving various mathematical and application.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS4N1	**Title :**	**Batch :**	2023-2026
		Non-Major Elective Paper-II: Flash Lab	**Semester:**	IV
Hrs/Week:	1		**Credits:**	2

Course Objective

The objective of this course is to make the students to learn about Macromedia Flash and develop their skills increating animations and special effects by using the tools.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Remember the concepts of animation with flash Software.	K1
CO2	To understand various applications and view its presentations.	K2
CO3	To apply the various tools available in Flash for creating animations.	K3
CO4	To get the idea about timeline, frames and motion tweens.	K4
CO5	To validate the animations by running the test movies.	K5

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS4N2	**Title :**	**Batch :**	2023-2026
		Non-Major Elective Paper-II: Internet Applications Lab	**Semester:**	IV
Hrs/Week:	1		**Credits:**	2

Course Objective

To enable the students to know how to work with internet, the usage of internet and its applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Know about basic of internet	K3
CO2	To analyze the concept through online.	K4
CO3	To get idea about online applications.	K5

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS4VA	**Title :**	**Batch :**	2023-2026
		VAC I: Python for Data Analytics	**Semester:**	IV
Hrs/semester:	30		**Credits:**	2*

Course Objective

To introduce the concepts of python programming constructs

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the concept of Decision making statements, looping constructs , functions forsolving basic programs	K3
CO2	Analyze the concepts of Lists, tuples and error handling mechanisms	K4
CO3	Evaluate a program incorporating all the python language constructs	K5

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS515			**Title:**	**Batch :**	2023-2026
				CC IX: Open Source Technologies	**Semester:**	V
Lecture Hrs/Week:	5	**Tutorial Hrs./ Sem.**	-		**Credits:**	5

Course Objective

On successful completion of the course the students are enabling to learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand PHP functions and arrays	K1
CO2	To remember PHP basic syntax for variables types, operators and flow controls	K2
CO3	To analyze basic MySQL commands	K3
CO4	To apply MYSQL commands to create and connect PHP application	K4
CO5	To evaluate application accessing restrictions, logging and monitoring Apacheweb server activity, optimizing and tuning MYSQL	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	H	L	L	M	M	H	L	M	H	L	L
CO2	H	H	L	L	M	H	H	L	M	H	L	L
CO3	H	H	H	M	H	H	H	M	H	M	H	M
CO4	H	H	H	M	H	H	M	H	M	H	H	M
CO5	M	H	H	H	H	M	M	M	H	H	H	H

H-High; M-Medium; L-Low.

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS516			**Title**	**Batch:**	2023 - 2026
				CC X: Cyber Security	**Semester:**	V
Lecture Hrs./Week	5	**Tutorial Hrs./Sem.**	-		**Credits:**	5

Course Objective

This course provides students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques. Upon the completion of this course, students should be able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Evaluate the computer network and information security needs of an organization.	K5
CO2	Assess cyber security risk management policies in order to adequately protect an organization's critical information and assets.	K2
CO3	Troubleshoot, maintain and update an enterprise-level information security system.	K3
CO4	Implement continuous network monitoring and provide real-time security solutions.	K4
CO5	Formulate, update and communicate short- and long-term organizational cyber security strategies and policies.	K5

Mapping

POs,PSOs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	M	M	H	H	H	M	M	H	H	H	M
CO2	M	M	H	H	H	M	M	H	H	H	M	M
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H	H	H	M
CO5	M	H	M	H	M	M	H	M	H	M	M	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (ComputerScience)	
Course Code:	22UCS5E1			**Title**	**Batch:**	2023 - 2026
				DSE I : Data Mining and Warehousing	**Semester:**	V
Lecture Hrs./Week	6	**Tutorial Hrs./Sem.**	-		**Credits:**	5

Course Objective

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the basics of data mining and data warehousing	K1
CO2	To understand the methodology of data mining and its best practices	K2
CO3	To analyze how data mining fits in with data warehousing, OLAP as well as Architecture of data warehousing.	K4
CO4	To apply data for data mining	K3
CO5	To evaluate different kinds of patterns with many data mining algorithms	K5

Mapping

PO /PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	L	H	M	L	M	H	M	M	M	H	M	H
CO2	M	H	H	M	M	H	H	M	H	H	M	H
CO3	M	H	H	M	H	H	H	M	H	H	H	H
CO4	M	H	M	M	H	H	M	H	H	H	H	H
CO5	H	H	H	H	H	M	M	H	H	H	H	M

H- High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS5E2			**Title:**	**Batch :**	2023-2026
				DSE I: Data Engineering with Google Cloud	**Semester:**	V
Lecture Hrs/Week:	6	**Tutorial Hrs./ Sem.**	-		**Credits:**	5

Course Objective

On successful completion of the course the students are enabling to data-driven decision making by collecting, transforming, and publishing data.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the concepts of Data and storage.	K1
CO2	To understand the idea of designing data models	K2
CO3	To Apply Data Engineering Concepts in building Data Processing Systems	K3
CO4	To Analyze the Operational zing of Data Processing Systems.	K4
CO5	To evaluate the Data Processing System.	K5

Mapping

POs,PSOs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	H	M	H	H	H	H	H
CO2	M	H	H	M	M	M	M	H	M	M	M	M
CO3	H	M	H	H	M	H	H	H	M	H	M	H
CO4	H	H	H	M	H	H	H	M	H	H	H	H
CO5	H	H	H	H	H	H	M	H	H	H	H	H

H-High; M-Medium; L-Low.

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS5E3			**Title**	**Batch:**	2023 - 2026
				DSE I: Mobile Application Development	**Semester:**	V
Lecture Hrs./Week	6	**Tutorial Hrs./Sem.**	-		**Credits:**	5

Course Objective

On successful completion of the course the students can design the right user interface of mobile application, and develop mobileapplications using various tools and platforms.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals and characteristics of mobile applicationand apply the right user interface for designing mobile application	K2, K3
CO2	Implement mobile application using UI toolkits and frameworks and also implement android application with multimedia support	K3
CO3	Design a mobile application that is aware of the resource constraints of mobile devices.	K5
CO4	Develop web based mobile application that accesses internet and location data	K5
CO5	Implement android application to use telephony for SMS communication	K3

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	M	M	H	H	H	M	H	M	M	M
CO2	M	H	M	L	H	H	H	M	H	L	H	H
CO3	M	H	L	L	M	H	M	M	M	M	H	H
CO4	H	H	L	H	H	H	H	M	H	L	H	H
CO5	H	H	L	H	H	H	M	L	H	L	H	H

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS517			**Title :**	**Batch :**	2023-2026
				CC Lab VII: Programming Lab in .NET	**Semester:**	V
Hrs/Week:	5	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

This Lab course will help students to achieve the following objectives:

1. Introduce to .Net IDE Component Framework.
2. Programming concepts in .Net Framework.
3. Creating website using ASP.Net Controls.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To Create user interactive web pages using ASP.Net. K3 CO2 K4 CO3 K5	K3
CO2	To Create simple data binding applications using ADO.Net connectivity	K4
CO3	Performing Database operations for Windows Form and web applications.	K5

Mapping

POs, PSOs / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	M	M	H	H	H	M	H	M	M	M
CO2	M	H	M	L	H	H	H	M	H	L	H	H
CO3	M	H	L	L	M	H	M	M	M	M	H	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS518			**Title**	**Batch:**	2023 - 2026
				CC Lab VIII: Programming Lab in PHP & MySQL	**Semester:**	V
Practical Hrs./Week	5	**Practical Hrs./Sem.**	-		**Credits:**	2

Course Objective

To learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember PHP basic syntax for variables types, operators and flow controls	K1
CO2	To understand PHP functions and arrays	K2
CO3	To analyze basic MySQL commands	K4
CO4	To apply MYSQL commands to create and connect PHP application	K3
CO5	To evaluate application accessing restrictions, logging and monitoringApache web server activity, optimizing and tuning MYSQL	K5

Mapping

PO /PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	M	H	L	L	M	M	H	L	M	L	M	L
CO2	H	M	L	L	M	H	L	L	M	M	H	L
CO3	H	H	H	M	M	M	M	M	L	M	H	M
CO4	H	H	H	M	H	H	M	H	M	L	M	M
CO5	M	M	H	H	H	M	M	M	M	H	M	M

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (ComputerScience)	
Course Code:	22UCS5S1			**Title**	**Batch:**	2023- 2026
				SEC II: Azure Fundamentals	**Semester:**	V
Lecture Hrs./Week	3	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

The objective of the course is to make the students to understand the basics of cloud computing and explore Microsoft Azure Storage services and their functionalities.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Remember the basics of cloud computing.	K1
CO2	Understand the fundamental concepts of Azure Virtual Machines.	K2
CO3	Apply availability options and scale sets for VMs	K3
CO4	Utilize Azure Load Balancer, Application Gateway, and Traffic Manager.	K4
CO5	Implement lifecycle management for Azure Blob storage.	K5

Mapping

POs, PSOs / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS5S2			**Title**	**Batch:**	2023 - 2026
				SEC II: Naan Mudhalvan: DevOps Foundation	**Semester:**	V
Lecture Hrs./Week or Practical Hrs./Week	3	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

The objective of the course is to provide the principles and practices of DevOps, focusing on the integration of development and operations to achieve efficient and collaborative software delivery.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the core concepts and principles of DevOps	K1
CO2	Understand the mechanisms to improve software quality and performance	K2
CO3	Apply DevOps practices and tools to streamline software development and deployment processes	K3
CO4	Analyze and evaluate the benefits and challenges of implementing DevOps in organizations	K4
CO5	Implement continuous integration, delivery, and deployment pipelines	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS619			**Title**	**Batch:**	2023 - 2026
				Core XI : R Programming	**Semester:**	VI
Lecture Hrs./Week	5	**Tutorial Hrs./Sem.**	-		**Credits:**	3

Course Objective

This course is laid to master techniques like data exploration, data visualization, and predictive analytics anddescriptive analytics with the help of R language.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the core to provide a conceptual understanding of the basics of R programming	K1
CO2	To understand the common programming Variable classes, Data frames and lists	K2
CO3	To deploy the concepts of Reading, creating and storing R -CSV file	K3
CO4	To figure out appropriate statistical tests using R	K4
CO5	To describe the various data visualization methods.	K5

Mapping

POs, PSOs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M: Medium L: Low

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	22UCS6E4			**Title:**	**Batch :**	2023-2026
					Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	**Tutorial Hrs./ Sem.**	-	**DSE-II**: Artificial Intelligence and Machine learning	**Credits:**	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problemsolving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To recall the basic logical searches, learning algorithms and improve decision makingsystems.	K1
CO2	To Summarize the idea about knowledge representation and reasoning	K2
CO3	To illustrate new knowledge with probabilistic reasoning solutions	K3
CO4	To Analyze Decision making system and its different process	K4
CO5	To evaluate the learning skills with many observations and machine learning algorithms	K5

Mapping

POs, PSOs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M: Medium L: Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS6E5			**Title:**	**Batch :**	2023-2026
				DSE-II: Front-End Development with React	**Semester:**	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	**Tutorial Hrs./ Sem.**	-		**Credits:**	5

Course Objective

On successful completion of the course the students are able to build a real world application along the way in plain react without complicated tooling.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the concepts of front end design.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To Apply essential hacks and simple techniques to solve React application development challenges.	K3
CO4	To Analyze the to wield complex topics such as Web pack and server-siderendering..	K4
CO5	To Learn to maximize the performance of React applications .	K5

Mapping

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M- Medium L: Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS6E6			**Title**	**Batch:**	2023 -2026
					Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	**Tutorial Hrs./Sem**	-	**DSE II:** MongoDB	**Credits:**	5

Course Objective

To understand fundamentals of NoSQL and apply MongoDB (NoSQL) for Data Analysis using CURDand User Management.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand NoSQL database Design multiple tables, and using group queries.	K3
CO2	Design a database based on a data model normalization to a specified level	K4
CO3	Understand and apply various operators and queries in Mongo DB	K3
CO4	Develop a text processing skill set and able to apply in creation of	K4,K5
CO5	Design a secure database and analyze with security protocols	K4, K6

Mapping

PO /PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS6E7			**Title:**	**Batch :**	2023-2026
				DSE-III: Information Retrieval	**Semester:**	VI
Lecture Hrs/Week:	4&2	Tutorial Hrs./ Sem.	-		**Credits:**	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To remember the concepts of artificial intelligence and Information retrieval systems.	K1
CO2	To understand the idea of retrieval models with similarity measures and ranking	K2
CO3	To Apply Queries using categorization and clustering	K3
CO4	To Analyze the filtering techniques using web search.	K4
CO5	To evaluate the extraction and integration of data with many applications.	K5

Mapping

POs,PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P010**	**PSO1**	**PSO2**
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS6E8			**Title:**	**Batch :**	2023-2026
				DSE-III :HTML, JavaScriptand JQuery For Web Designing	**Semester:**	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	**Tutorial Hrs./ Sem.**	-		**Credits:**	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the concepts of basic web designing languages.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To Apply Queries using categorization and clustering	K3
CO4	To Analyze the validation and querying techniques using Javascript and jQuery.	K4
CO5	To evaluate the web forms for different applications.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc. CS			**Programme Title:**	Bachelor of Computer Science	
Course Code:	22UCS6E9			**Title**	**Batch:**	2023 - 2026
				DSE III: Angular and Node JS	**Semester:**	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	**Tutorial Hrs./Sem.**	-		**Credits:**	5

Course Objective

Able to understand the theory and practical front end tools of web full stack developments: Angular and Node JS

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Understand Client Side MVC and SPA	K2
CO2	Explore AngularJS Component and develop an Angular JS	K3,K4
CO3	Develop an AngularJS Single Page Application from scratch	K3,K6
CO4	Demonstrate an Understanding of the use of and Node.js core modules	K1,K3
CO5	Apply MongoDB ,Middleware and make connectivity with front end tools	K3,K6

Mapping

PO, PSO / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO10**	**PSO1**	**P**
CO1	H	M	H	L	M	M	L	L	M	L	H	H
CO2	H	H	H	L	H	H	M	M	H	L	H	H
CO3	H	H	H	L	H	H	H	M	H	M	H	H
CO4	H	H	H	L	M	M	M	M	H	M	H	H
CO5	H	M	H	L	H	H	L	M	H	L	H	H

H-High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS620			**Title**	**Batch:**	2023 - 2026
				CC Lab IX: R Programming Lab	**Semester:**	VI
Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

On successful completion of the course the students learn the practical aspects of the R programming language

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	To implement Vector R operations	K3
CO2	To review and analyze data frames and objects	K4
CO3	To validate how Bar charts and Pie charts are implemented	K5

Mapping

POs, PSOs / COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
CO1	H	H	M	H	H	H	M	H	M	H	H	M
CO2	H	M	M	H	H	M	M	H	M	H	M	M
CO3	M	H	H	M	M	H	H	M	H	M	H	H

H - High; M-Medium; L-Low

Programme code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	22UCS621			**Title :**	**Batch :**	2023-2026
				CC Lab X: Programming Lab in Android	**Semester:**	VI
Hrs/Week:	5	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Course Objective

The objective of this course is to make the students to understand the Android platform's organization, patterns and programming mechanisms and be able to use them effectively to develop their own Android applications.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand Android OS, gradle, Android Studio	K3
CO2	Design and develop an application using Database	K4
CO3	Develop UI based Mobile Application using Android Studio	K5

Mapping

POs, PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	M	H	L	H	H	M	H	M	H
CO2	H	H	M	H	H	H	H	M	M	M	H	H
CO3	M	H	H	H	H	H	H	H	H	M	H	H

H - High; M-Medium; L-Low

Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	22UCS622			**Title**	**Batch:**	2023 – 2026
				Project	**Semester:**	VI
Lecture Hrs./Week or Practical Hrs./Week	-	**Tutorial Hrs./Sem.**	-		**Credits:**	2

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	10	50
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	10	
III	Coding, Input forms, Output format, Testing OR Development, Testing	20	
IV	Preparation of Report & Submission	10	

External Assessment: 50 Marks

Mode of Evaluation	Marks	Total	Grand Total
Project Report			50
Title Relevance of the Industry/Institute	05	30	
Technology	05		
Design and development Publishing	10		
Testing, Report	10		
Viva Voce			
Project Presentation	10	20	
Q&A Performance	10		

Programme code:		B.Sc		**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:		22UCS6S1		**Title :**	**Batch :**	2023-2026
				SEC III: Naan Mudhalvan: Programming, Data Structures and Algorithms using Python	**Semester:**	VI
Practical Hrs./Week	3	**Tutorial Hrs./ Sem**	-		**Credits:**	2

Course Objective

The objective of this course is to enable the student to understand in-depth data structures and to know how to apply them to resolve practical issues using Python.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamentals of writing Python scripts	K1
CO2	Understand Lists, Dictionaries and Regular expressions in Python.	K2
CO3	Apply linear and non-linear data structures using Python	K3
CO4	Analyze searching and sorting techniques	K4
CO5	Create, run and manipulate Python Programs using core data structures like Lists	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Programme code:		B.Sc		**Programme Title :**	**Bachelor of Science (Computer Science)**	
Course Code:		22UCS6S2		**Title :**	**Batch :**	2023-2026
				SEC III: Naan Mudhalvan: Data Science Foundation	**Semester:**	VI
Practical Hrs/Week:	3	**Tutorial Hrs./ Sem**	-		**Credits:**	2

Course Objective

The Objective is to explore, sort and analyze mega data from various sources in order to take advantage of them and reach conclusions to optimize business processes or for decision support

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of data science and to discover patterns in data.	K1
CO2	To makes sense of the data through a variety of statistical techniques.	K2
CO3	To discuss the data extraction, wrangling, and pre-processing,	K3
CO4	To understand the various ML technologies	K4
CO5	To explore and visualizing data.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

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