

GOVERNMENT COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to Anna University)

BARGUR - 635 104

Curriculum for

COMPUTER SCIENCE AND ENGINEERING

CYBER SECURITY

(Full Time)

I TO VIII SEMESTERS

2025

Regulation

For the students admitted

AY 2025-26 onwards

As on 12.03.2026

**OFFICE OF CONTROLLER OF
EXAMINATIONS**



**GOVERNMENT COLLEGE OF
ENGINEERING BARGUR - 635 104**

Website: www.gcebargur.ac.in



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104
(Autonomous institute affiliated to Anna University, Chennai)
Department Computer Science and Engineering (Cyber Security)



Vision of the Department

“To be a leading center of excellence in Cybersecurity, known for developing highly skilled, ethical, and socially responsible professionals and researchers who contribute to the security and resilience of the digital world.”

Mission of the Department

M1: Technical Excellence

To provide a comprehensive curriculum that integrates core computer science principles with specialized training in network security, digital forensics, and threat intelligence.

M2: Innovation & Practical Skills

To foster an environment of hands-on learning through state-of-the-art security labs, simulating real-world cyber attacks and defense scenarios to build practical troubleshooting skills.

M3: Professionalism & Ethics

To cultivate a "white-hat" mindset, emphasizing legal compliance, digital ethics, and professional integrity in every aspect of cybersecurity operations.

M4: Industry & Societal Impact

To collaborate with industry leaders and government agencies to address national security challenges and promote cyber-awareness within the community.

Program Educational Objectives (PEOs):

Graduates of the Cyber Security program will:

PEO 1: Cybersecurity Expertise

Possess a strong foundation in cybersecurity principles, enabling them to design and implement secure systems and networks.

PEO 2: Research and Innovation

Engage in research activities, contributing to advancements in cybersecurity technologies and methodologies.

PEO 3: Professional Development

Demonstrate leadership, ethical practices, and effective communication skills, preparing them for roles in industry, academia, and entrepreneurship.

PEO 4: Continuous Upgradation

Pursue continuous learning to adapt to the evolving cybersecurity landscape, ensuring sustained professional growth.



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CURRICULUM 2025

B.E. - Computer Science and Engineering (Cyber Security)

Academic Year: 2025 -2026 | Regulation: [R2025]

Program Overview:

Computer Science and Engineering (Cyber Security) program is an undergraduate degree focused on building a strong computer science foundation while specializing in protecting digital systems and data from cyber threats. Computer Science and Engineering with a focus on Cyber Security is a critical and rapidly growing field, especially as cyber threats continue to evolve and become more sophisticated. This specialization equips students with the knowledge and the skills to protect systems, networks and data from cyber attacks and unauthorized access.

The Department of Cyber Security is committed to equipping students with the knowledge and skills necessary to protect digital assets and secure information systems in an increasingly connected world. The curriculum covers core subjects with a strong foundation in core concepts such as Problem-Solving Technique, Networks, cryptography, network security and Penetration Testing, ethical hacking, and digital forensics, the department emphasizes both theoretical understanding and hands-on practical experience to prepare graduates for careers in cybersecurity.

Program Duration: 4 Years (8 Semesters)

Total Credits Required: 172 Credits

Affiliated University: Anna University, Chennai

NBA Accreditation Status: NIL (Newly Started Course)

Program Outcomes:

1. Engineering Knowledge

Apply knowledge of mathematics, science, and engineering fundamentals—specifically in areas like cryptography, network security, and secure coding—to solve complex cyber security problems.

2. Problem Analysis

Identify, formulate, and analyze complex security challenges using principles of mathematics and computing to reach substantiated conclusions regarding system vulnerabilities and threats.



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3. Design and Development of Solutions

Design solutions for complex security problems, including the development of robust security architectures, firewalls, and intrusion detection systems that meet specified needs for data integrity and confidentiality.

4. Conduct Investigations of Complex Problems

Use research-based knowledge and methods, including the analysis of malware, forensic investigation, and threat hunting, to provide valid conclusions on security breaches.

5. Modern Tool Usage

Select and apply appropriate techniques and modern engineering/IT tools, such as Kali Linux, Metasploit, Wireshark, and SIEM platforms, to predict and mitigate cyber-attacks.

6. The Engineer and Society

Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues, specifically the impact of cyber warfare and digital privacy on the public.

7. Environment and Sustainability

Understand the impact of professional cybersecurity solutions in societal and environmental contexts, ensuring that security infrastructures are sustainable and energy-efficient.

8. Ethics

Apply ethical principles and commit to professional ethics and responsibilities. This is critical in cyber security to ensure "White Hat" practices and compliance with data protection laws.

9. Individual and Team Work

Function effectively as an individual and as a member or leader in diverse teams, such as Security Operations Centers (SOC) or Incident Response Teams.

10. Communication

Communicate effectively on complex security activities with the engineering community and society at large, such as writing technical vulnerability reports or presenting security awareness training.



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11. Project Management and Finance

Demonstrate knowledge and understanding of security management principles. Apply these to one's own work as a member or leader in a team to manage security projects within budgetary and time constraints.

Program Specific Outcome:

PSO 1: Cyber Threat Analysis and Mitigation

Analyse cyber threats and implementing appropriate mitigation strategies to protect information systems.

PSO 2: Secure System Design

Proficient in designing and developing secure systems and applications, incorporating best practices in cybersecurity.

PSO 3: Compliance and Ethical Practices

Understand and apply legal, ethical, and compliance standards in the field of cyber security, ensuring responsible professional practice.



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Curriculum - R 2025 mapping against the NIST Cyber security Framework (CSF) 2.0 and the NICE Workforce Framework (NIST SP 800-181)

The R2025 B.E. Computer Science and Engineering (Cyber Security) curriculum at Government College of Engineering, Bargur, is highly aligned with international standards. By mapping our curriculum against the **NIST Cyber security Framework (CSF) 2.0 and the NICE Workforce Framework (NIST SP 800-181)**, we can identify how our program prepares students for specific industry roles.

1. Mapping to NIST CSF 2.0 (Outcome-Based)

The NIST CSF focuses on high-level organizational security functions. Our curriculum covers **all six primary functions**:

The CSF Core Functions — **GOVERN, IDENTIFY, PROTECT, DETECT, RESPOND, and RECOVER** — organize cybersecurity outcomes at their highest level.

NIST Function Corresponding R2025 Courses Curriculum Strength

- **Govern Cyber Law, Professional Ethics (Sem VII) Integrated legal and ethical compliance.**
- **Identify Foundations of Cyber Security (Sem II) Strong focus on foundational threat analysis.**
- **Protect Cryptography (Sem V), Cloud Security (Sem VI) Extensive "Professional Core" (83 credits).**
- **Detect IDS/IPS (PE), Network Security (Sem VI) Technical focus on intrusion detection.**
- **Respond Incident Response (PLO 5) Direct Program Outcome for response plans.**
- **Recover Distributed Systems (PE), Cyber Forensics (Sem VII) Covered via Digital Forensics and eDiscovery.**



2. Mapping to NICE Framework (Role-Based)

The NICE framework categorizes cybersecurity work into **seven functional areas**.

- **Securely Provision (SP) - Authorizing Official**
- **Operate and Maintain (OM) – Database Administrator**
- **Oversee and Govern (OV) - Cyber Legal Advisor**
- **Protect and Defend (PR) - Cyber Defense Analyst**
- **Analyze (AN) - Threat/Warning Analyst**
- **Collect and Operate (CO) - All Source-Collection Manager**
- **Investigate (IN) - Cyber Crime Investigator**

Our curriculum structure, particularly through its Verticals, aligns closely with these categories:

Securely Provision (SP): Vertical 1 (Product Development) and Engineering Secure Software Systems (Sem V) align here, preparing students for **"Software Developer" or "Systems Architect" roles**.

Investigate (IN): Vertical 2 (Application Security) includes Digital and Mobile Forensics, mapping directly to the **"Digital Forensics Examiner" work role**.

Protect and Defend (PR): Vertical 3 (Security and Privacy) focuses on Ethical Hacking and Malware Analysis, corresponding to **"Cyber Defense Analyst" roles**.

Analyze (AN): Vertical 4 (AI and Security), including Machine Learning for Cyber Security (Sem V), aligns with **"Threat/Warning Analyst" roles**.

3. Strategic Observations:

- **Hands-on Competency:** The NICE framework **emphasizes KSAs (Knowledge, Skills, and Abilities)**. Our curriculum addresses this with a **high ratio of laboratory courses**, such as **Operating Systems and Security Laboratory in Kali Linux (Sem IV)** and **Network Security and Penetration Testing (Sem VI)**.



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- **Interdisciplinary Breadth:** The **"Open Electives"** and **"Technical Club activities"** align with the NICE framework's goal of **fostering a diverse workforce**.
- **Professional Readiness:** Our **"Department Specific Requirements"** (Internships, Hackathons, Industry Lectures) directly map to the **"Workforce Structure"** component of the NICE framework by providing real-world exposure.
- **The Cybersecurity Research Scientist:** we can map **Vertical 4 (Artificial Intelligence and Security)** from our R2025 curriculum to a specific high-impact role in the NICE Workforce Framework: the Cybersecurity Research Scientist.
 - This mapping demonstrates to prospective students and industry partners that **our graduates are not just "users" of AI, but "architects" of secure AI systems**.
 - **Work Role Mapping:** Cybersecurity Research Scientist
 - **Category:** Design and Development (DD)
 - **Role Description:** Conducts research into fundamental computer science as theorists, designers, or inventors to develop solutions for complex security problems.

Curriculum Alignment (Vertical 4 to NICE KSAs)

Our curriculum's specific courses directly provide the **Knowledge, Skills, and Abilities (KSAs)** required for this role:

R2025 Curriculum Course NICE KSA / Task Alignment

- Machine Learning for Cyber Security K0005: Knowledge of data mining principles and practices.
- Neural Networks and Deep Learning S0078: Skill in developing or executing specialized algorithms for AI models.
- Generative AI and Prompt Engineering T0213: Provide technical findings from computer examinations and situational awareness.
- Ethical & Legal Implications of AI PSO 3: Understand and apply legal, ethical, and compliance standards.



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Credit Distribution Comparison

Component	Anna University	AICTE Norms	GCE Bargur
Mathematics & Basic Sciences (BS)	25	23	25
Humanities & Social Sciences (HS)	12	16	11
Engineering Sciences (ES)	18	29	14
Professional Core (PC)	61	59	83
Professional Electives (PE)	18	12	18
Open Electives (OE)	12	09	09
Project Work (PR)	16	15	12
Mandatory courses (MC)	-	-	00
Total Credits	162	163	172

Note : Professional Core (PC) credits including Department Specific Requirement credits.

Category Abbreviations

BS - Basic Sciences | **ES** - Engineering Sciences | **PC** - Professional Core

PE - Professional Electives | **OE** - Open Electives | **HS** - Humanities & Social Sciences

| **MC** Mandatory courses | **PR** - Project

Notes

- Legend: L - Lecture Hours per Week | T - Tutorial Hours per Week | P - Practical Hours per Week | C - Credits
- Credits are calculated as: $L + T + P/2$ for theory courses with lab, and based on contact hours for other courses.
- Professional Electives are domain-specific advanced subjects.
- Open Electives can be chosen from any other department to promote interdisciplinary learning.

Changes from previous curriculum R2022:

NIL



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SEMESTER-WISE CURRICULUM STRUCTURE (for 8 semesters)

SEMESTER I

S.No	Subject Code	Subject Name	L	T	P	C	Category
1	25ZHS101	English for Engineers-I	3	0	0	3	HS
2	25ZBS102	Matrices and Calculus	3	1	0	4	BS
3	25ZBS103	Engineering Physics	3	0	2	4	BS
4	25YBS104	Chemistry	3	0	2	4	BS
5	25ZES105	Programming in C	3	0	0	3	ES
6	25YPC106	Problem Solving Techniques	3	0	0	3	PC
7	25ZMC107	/Heritage of Tamils	1	0	0	0	MC
8	25ZES108	Programming in C Laboratory	0	0	3	1.5	ES
9.	25YPC111	Problem Solving Techniques Laboratory	0	0	3	1.5	PC
Total			19	1	10	24	

SEMESTER II

S.No	Subject Code	Subject Name	L	T	P	C	Category
1	25ZHS201	English for Engineers-II	3	0	0	3	HS
2	25ZBS202	Random Process and Linear Algebra	3	1	0	4	BS
3	25ZBS203	Physics for Information Science	3	0	0	3	BS
4	25YES204	Engineering Graphics	1	0	4	3	ES
5	25ZES205	Python Programming	3	0	0	3	ES
6	25YPC206	Foundations of Cyber Security	3	0	0	3	PC



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S.No	Subject Code	Subject Name	L	T	P	C	Category
7	25ZMC207	/	1	0	0	0	MC
		Tamils and Technology					
8	25ZES208	Engineering Practices Laboratory	0	0	4	2	ES
9	25ZES209	Python Programming Laboratory	0	0	3	1.5	ES
10	25ZHS210	Communication English Laboratory	0	0	2	1	HS
Total			14	1	13	23.5	

SEMESTER III

S.No	Subject Code	Subject Name	L	T	P	C	Category
1	25ZBS301	Discrete Mathematics	3	1	0	4	BS
2	25YPC302	Digital Principles and Computer Organization	3	0	0	3	PC
3	25YPC303	Data Structures	3	0	0	3	PC
4	25YPC304	Foundations of Data Science	3	0	0	3	PC
5	25YPC305	Design and Analysis of Algorithms	3	1	0	4	PC
6	25YMC306	Constitution of India	1	0	0	0	MC
8	25YPC307	Digital Principles and Computer Organization Laboratory	0	0	3	1.5	PC
9	25YPC308	Data Science Laboratory	0	0	3	1.5	PC
10	25YPC309	Data Structures and Algorithms Laboratory	0	0	4	2	PC
Total			19	2	9	23	



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SEMESTER IV

S.No	Subject Code	Subject Name	L	T	P	C	Category
1	25YPC401	Theory of Computation	3	1	0	4	PC
2	25YPC402	Artificial Intelligence and Machine Learning	3	0	0	3	PC
3	25YPC403	Computer Networks	3	0	0	3	PC
4	25YPC404	Operating Systems and Security	3	0	0	3	PC
5	25YPC405	Database Management Systems and Security	3	0	0	3	PC
6	25ZBS406	Environmental Sciences and Sustainability	2	0	0	2	BS
7	25YPC407	Computer Networks Laboratory	0	0	3	1.5	PC
8	25YPC408	Operating Systems and Security Laboratory in Kali Linux	0	0	3	1.5	PC
9	25YPC409	Database Management Systems and Security Laboratory	0	0	3	1.5	PC
Total			17	1	9	23.5	

SEMESTER V

S.No	Subject Code	Subject Name	L	T	P	C	Category
1		Machine Learning for Cyber Security	3	0	0	3	PC
2		Cryptography	3	0	0	3	PC
3		Engineering Secure Software Systems	3	0	0	3	PC
4		Compiler Design	3	0	0	3	PC
5		Professional Elective-I	2	0	2	3	PE



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S.No	Subject Code	Subject Name	L	T	P	C	Category
6		Professional Elective-II	2	0	2	3	PE
7		Internship (Minimum 4 Weeks)	0	0	0	1	DS
8		Machine Learning for Cyber Security Laboratory	0	0	3	1.5	PC
9		Cryptography Laboratory	0	0	3	1.5	PC
Total			16	0	10	23	

SEMESTER VI

S.No	Subject Code	Subject Name	L	T	P	C	Category
1		Embedded Systems and IoT	3	0	0	3	PC
2		Cloud Architecture and Security	3	0	2	4	PC
3		Network Security and Penetration Testing	3	0	2	4	PC
4		Professional Elective-III	2	0	2	3	PE
5		Professional Elective-IV	2	0	2	3	PE
6		Open Elective- I	3	0	0	3	OE
7		Open Elective-II	3	0	0	3	OE
8		Technical Seminar / Publications/ Participation in Conference	0	0	0	1	DS
Total			19	0	8	24	



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SEMESTER VII

S.No	Subject Code	Subject Name	L	T	P	C	Category
1		Cyber Law, Human Values and Professional Ethics in Cybersecurity	3	0	0	3	PC
2		Management and Entrepreneurship	3	0	0	3	HS
3		Cyber Forensics and eDiscovery	3	0	2	4	PC
4		Professional Elective-V	2	0	2	3	PE
5		Professional Elective-VI	2	0	2	3	PE
6		Open Elective-III	3	0	0	3	OE
7		Project-I	0	0	8	4	EE
Total			16	0	14	23	

SEMESTER VIII

S.No	Subject Code	Subject Name	L	T	P	C	Category
1		Project-II	0	0	16	8	EE
Total			0	0	16	8	

Total Number of Credits: 172



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Professional Electives (PE)

Students must choose 6 Professional Electives

1	25PE501	Neural Networks and Deep Learning	2	0	2	3
2	25PE502	Natural Language Processing	3	0	0	3
3	25PE503	Generative AI and Prompt Engineering	3	0	0	3
4	25PE504	Reactive Machines and Self-aware AI	3	0	0	3
5	25PE505	Ethical Hacking	2	0	2	3
6	25PE506	Privacy in Communication Networks	3	0	0	3
7	25PE507	Wearable Computing	3	0	0	3
8	25PE508	Software Defined Networks	3	0	0	3
9	25PE601	Malware Analysis	2	0	2	3
10	25PE602	Information Security	3	0	0	3
11	25PE603	Security in MANETs and VANETs	3	0	0	3
12	25PE604	Cyber threat for IoT and Cloud	3	0	0	3
13	25PE605	Web Application Security	2	0	2	3
14	25PE606	UI and UX Design and Human centered Design	3	0	0	3
15	25PE607	DevOps	3	0	0	3
16	25PE608	Vibe Coding	3	0	0	3
17	25PE701	Social Network Security	2	0	2	3
18	25PE702	Digital and Mobile Forensics	3	0	0	3
19	25PE703	Intrusion Detection and Prevention Systems	3	0	0	3
20	25PE704	Web and IoT Security	3	0	0	3
21	25PE705	Cryptocurrency and Blockchain Technologies	2	0	2	3
22	25PE706	Edge and Fog computing	3	0	0	3
23	25PE707	Neuromorphic and Energy Efficient Computing	3	0	0	3
24	25PE708	Quantum Computing	3	0	0	3



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Open Electives (OE)

Students must choose 4 Open Electives from other departments (3 credits each = 12 credits)

To provide interdisciplinary engineering knowledge, subjects may be proposed. Numbers not limited to 5						
1	250E001	Introduction to Cyber Security	3	0	0	3
2	250E002	Introduction to Ethical Hacking	3	0	0	3
3	250E003	Introduction to Linux	3	0	0	3
4	250E004	Cyber Law Professional Ethics in Cybersecurity	3	0	0	3
5	250E005	Introduction to Cryptography	3	0	0	3



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VERTICALS

Vertical 1 Product Development	Vertical 2 Application Security	Vertical 3 Security And Privacy	Vertical 4 Artificial Intelligence and Security	Vertical 5 Computing	Vertical 6 Internet of Things and Smart Applications
Design Thinking and Innovation	Social Network Analysis and Security	Information Security	AI in cyber Security	Augmented Reality/ Virtual Reality	Dynamic Paradigm for IoT
UI and UX Design and Human centered Design	Digital and Mobile Forensics	Ethical Hacking	Natural Language Processing	Edge and Fog computing	Smart IoT Architecture
Open-Source Systems and Security	Firewall Design	Malware analysis	Generative AI and Prompt Engineering	Granular Computing	Wearable Computing
DevOps	Intrusion Detection and Prevention Systems	Security in MANETs and VANETs	Ethical and Legal Implications of AI	Neuromorphic and Energy Efficient Computing	IoT in 5G Networks
Vibe Coding	Web and IoT Security	Security and Privacy in Cloud	Reactive Machines and Self-aware AI	Quantum Computing	IoT and Smart Cities
Web Application Security	Cryptocurrency and Blockchain Technologies	Cyber threat for IoT and Cloud	Neural Networks and Deep Learning	Software Defined Networks	Privacy in Communication Networks



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DEPARTMENT SPECIFIC REQUIREMENTS

Sl.No	Course Code	DSR Activity	Course Registration	Evaluation Component	CAT	Credit
1	25YDSR01	SUMMER INTERNSHIP Industrial training/internship for a minimum period of four weeks during the summer vacation of III year (VI Semester).	along with the courses for VII semester	Report and viva-voce examination.	PC	1
2	25YDSR02	INDUSTRIAL LECTURE A minimum of five lectures of two hours' duration by industry experts	along with the courses for IV semester	Attendance, quizzes at the end of each lecture	PC	1
3	25YDSR03	IDEA / PROOF OF CONCEPT / DESIGN THINKING problem identification, design thinking and development of innovative solutions for real-world problem	along with the courses for V semester	Report and present their work before a departmental evaluation committee.	PC	1
4	25YDSR04	TECHNICAL SEMINAR / PUBLICATIONS / PARTICIPATION IN CONFERENCES Students shall present a technical seminar, publish a technical article/paper or participate in technical conferences, workshops or symposiums approved by the Department.	along with the courses for VII semester	Documentary evidence in the form of publication details and/or participation certificates, and a presentation.	PC	1
5	25YDSR05	TECHNICAL CLUB ACTIVITY Technical Club Coordinators shall organize, coordinate and document departmental/institutional	along with the courses for VII semester	Technical Club Activity Report with documentary evidence, presentation and viva-	HS	1



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		technical club activities such as workshops, seminars, guest lectures, technical competitions, project exhibitions, hackathons, industrial interactions and other approved technical events.		voce examination.		
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Institute Requirement

Sl. No	Course Code	COURSE TITLE	CAT	Credit
1	25IR1001	Induction Program (All first-year students must attend the induction program to understand institute culture, ethics, and learning practices.)	HS	0
2	25IR1002	Participation in Hackathon (Students must participate in, at least one hackathon to encourage innovation, teamwork, and problem-solving aptitude.)	HS	0

Note:

- Department-Specific Requirement (DSR) courses shall be completed between the 3rd and 6th semesters.
- All listed activities are mandatory components of the curriculum and must be completed before graduation.
- Students must maintain records such as attendance, reports, or participation certificates for verification.
- Department coordinators will verify and forward activity completion reports to the Head of the Department.
- Credits for each activity will be awarded only after successful completion and submission of required documents.
- Non-completion of any activity within the scheduled semester must be compensated in the subsequent semester.
- Evidence of participation and performance will be maintained in the department portfolio and subject to audit.
- The consolidated list of students completing these requirements will be forwarded to the Controller of Examinations for grade entry.

Signature of HOD

SEMESTER - I



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of English



Subject Code	25ZHS101	Subject Title	English for Engineers-I
Category	HSMC	L-T-P-C	3-0-0-3
Regulation	2025	Semester	I
Prerequisites	Common vocabulary and ability to frame simple sentences in English		

Course Objectives:

1. To comprehend and interpret complex information from diverse academic audio and video sources by focusing on accent variations and core message extraction.
2. To equip learners with a good command of technical vocabulary and grammatical structures to ensure accuracy in professional discourse.
3. To train students in applying skimming and scanning techniques to analyze technical articles, user manuals, and gadget reviews for detailed comprehension and information retrieval.
4. To enable students to produce well-structured technical documents, including reports, minutes of meetings, instructions, and the interpretation of data from charts and graphs.
5. To foster confidence in delivering short presentations (JAM) seeking clarifications and providing process descriptions.

Course Content:

[VOCABULARY] (9 Hours)

Technical Vocabulary – Formal and Informal Vocabulary – Avoidance of Jargon -Verbal Analogies One Word Substitution – Tenses- Linking Words – Fixed and Semi-Fixed Expressions.

[LANGUAGE] (9 Hours)

Numerical Adjectives - Embedded Sentences - Subject-Verb Agreement - If Conditionals - Active Voice and Passive Voice – Phrasal Verbs – Misplaced Modifiers – Discourse Markers – Question Tag

[LISTENING AND SPEAKING] (9 Hours)

Listening to TED/ POD Talks – Self introduction- Formal and Informal Conversation - Greeting People - Asking for and Giving directions - Asking for and Offering Help – Seeking Clarification – Speaking about a Process- JAM (short presentation)

[READING] (9 Hours)

Skimming and Scanning – Accent Variations - Pronunciation - Reading for Detailed Comprehension - Reading and Understanding Technical Articles - Reading Advertisements.- Gadgets reviews; user manuals.

[WRITING] (9 Hours)

Writing Instructions, Recommendations and Warnings - Interpreting Charts and Graphs - Describing a Process - Extended Definitions - Report Writing - Minutes of Meeting – Jumbled Sentences.

Total Hours: 45



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Department of English



Upon successful completion of this course, students will be able to:

CO	COURSE OUTCOMES	Bloom's Level
CO1	Recall and identify technical vocabulary, phrasal verbs, and grammar rules to form accurate sentences.	L1
CO2	Summarize and interpret key information from complex academic audio such as TED Talks and podcasts to demonstrate active listening comprehension.	L2
CO3	Demonstrate fluent communication in formal and informal contexts, including giving directions, seeking clarifications, and delivering short presentations (JAM).	L3
CO4	Analyze technical articles and user manuals to distinguish between denotative and connotative meanings and extract detailed specifications.	L4
CO5	Evaluate and interpret data from charts and graphs, technical documents, including reports, minutes of meetings, and extended definitions, using a logical structure with a professional command of the language.	L5

TEXT BOOKS:

1. D Praveen Sam KN Shoba, "A Course in Technical English", Cambridge University Press. 2020.

REFERENCES BOOKS:

1. Markel, Mike. "Technical Communication" New York: Bedford. 2007.
2. "Communication Skills in English" Edited by The department Of English, Osmania University, Hyderabad, Oxford University Press. 1998.
3. Laplante, A. Philip. "Technical Writing: A Practical guide for Engineers, Scientists and Nano Technical Professionals" CRC Press. 2019.
4. Gerson, Sharon & Steven Gerson. "Technical Communication: Process and Product". Pearson. 2019.

E-resources:

1. innovate.ieee.org/ieee-english-for-technical-professionals/
2. onlinecourses.nptel.ac.in/noc20hs56/preview
3. swayam.gov.in
4. [cambridge english for engineering](https://www.cambridge.org/9781107617000)



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

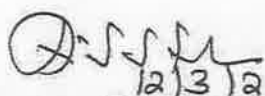
Department of English



Course Articulation Matrix:

CO	Program Outcomes (PO)										
	1	2	3	4	5	6	7	8	9	10	11
CO1	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2
CO3	-	-	-	-	-	-	-	-	3	2	-
CO4	-	-	-	2	-	-	-	-	3	-	3
CO5	-	-	-	3	-	-	-	-	3	-	-

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation


12/3/2026

Course Designed By

Dr. A. Jesu Steephan Samy. AP/Eng.


12/3/2026
BOS Approval

Date: 12.03.2026

**GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104****(Autonomous institute affiliated to Anna University, Chennai)****Department of Mathematics**

Subject Code	25ZBS102	Subject Title	MATRICES AND CALCULUS
Category	BASIC SCIENCE	L-P-T-C	3-0-1-4
Regulation	2025	Semester	I
Prerequisites	Basic knowledge of algebra, trigonometry, and elementary calculus.		

Course Objectives:

1. Provide essential matrix algebra tools used in engineering.
2. Strengthen understanding of single-variable differential calculus.
3. Introduce functions of several variables, important for advanced engineering problems.
4. Train students in integration techniques for various applications.
5. Familiarize students with multiple integrals and their applications in physical sciences and engineering.

Course Content:**[MATRICES] (9+3)**

Eigen values and Eigen vectors of a real matrix–Characteristic equation–Properties of Eigen values and Eigen vectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation –Reduction of a quadratic form to canonical form by orthogonal transformation–Nature of quadratic forms–Applications: Stretching of an elastic membrane.

[DIFFERENTIAL CALCULUS] (9+3)

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

[FUNCTIONS OF SEVERAL VARIABLES] (9+3)

Partial differentiation – Homogeneous functions and Euler's theorem –Total derivative– Change of variables –Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

[INTEGRAL CALCULUS] (9+3)

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions–Improper integrals–Applications: Hydrostatic force and pressure, moments and centres of mass.

[MULTIPLE INTEGRALS] (9+3)

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals–Applications: Moments and centres of mass, moment of inertia.

Total Hours: 60*Upon successful completion of this course, students will be able to:*

CO	Course Outcome	Bloom's Level
CO1	Define and recall fundamental concepts, definitions, standard formulas and theorems related to matrices, differential calculus, functions of several variables, integral calculus and multiple integrals.	L1



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Mathematics



CO2	Explain the concepts and interpret the relationships among eigenvalues, derivatives, partial derivatives, integrals and multiple integrals, including their properties, rules and geometric or physical meaning.	L2
CO3	Apply eigenvalue methods, Cayley–Hamilton theorem, differentiation and integration techniques, Jacobians, and multiple integrals to solve standard mathematical problems.	L3
CO4	Analyze and differentiate appropriate methods for solving problems involving eigenvalues, quadratic forms, derivatives, Jacobians, and multiple integrals by examining given conditions and constraints.	L4
CO5	Apply suitable mathematical techniques from matrices, differential calculus, functions of several variables, integral calculus and multiple integrals to solve structured and real-world problems.	L5

Text Books:

1. Kreyszig.E, "Advanced Engineering Mathematics" John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

Reference Books:

1. Anton.H, Bivens.I and Davis.S, "Calculus", Wiley, 10th Edition, 2016.
2. Bali.N., Goyal.M. and Watkins.C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan.S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S.Viswanathan Publishers Pvt. Ltd., Chennai, 2009
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi,

Course Articulation matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	3	2	-	-	-	-	1	-
CO2	3	3	2	3	2	-	-	-	-	1	-
CO3	3	3	2	3	2	-	-	-	-	1	-
CO4	3	3	2	3	1	-	-	-	-	1	-
CO5	3	3	2	3	1	-	-	-	-	1	-

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

S. G. 27/3/20

(S. Gowtham Ponkash AP(T)/MAT)

BOS Approval

Date:

27/3/20



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Physics



Subject Code	25ZBS103	Subject Title	Engineering Physics
Category	Basic Science	L-P-T-C	3-2-0-4
Regulation	2025	Semester	I (CSE, CSE-CS, ECE, Mech)
Prerequisites	Fundamental knowledge of mechanics, optics, and thermal physics at higher secondary level. Familiarity with mathematical concepts such as algebra, differentiation, and integration. Basic understanding of electricity and magnetism. Ability to perform simple physics experiments and data analysis.		

Course Objectives:

1. Provide fundamental knowledge of properties of matter, thermal physics, quantum mechanics, lasers and fibre optics, and physics of materials, enabling students to understand the basic physical principles governing mechanical, thermal, optical, and material properties.
2. Enable students to apply the concepts of elasticity, heat transfer, quantum phenomena, laser principles, and optical fibre propagation to interpret the working of practical devices and systems used in engineering and scientific applications.
3. Develop the ability to analyze the behavior of physical systems and materials, including stress-strain relationships, heat conduction mechanisms, quantum mechanical phenomena, laser operation, and the magnetic, dielectric, and superconducting properties of materials.
4. Equip students with the conceptual ability to design or conceptualize engineering and scientific applications such as optical fibre sensors, laser-based systems, superconducting devices, and materials with specific magnetic or dielectric properties.
5. Encourage students to enhance their learning through assignments, presentations, seminars, and team-based activities, promoting analytical thinking, communication skills, and collaborative learning related to modern developments in physics and materials science.

COURSE CONTENT

PROPERTIES OF MATTER

9

Elasticity: stress- strain – Hooke's law – modulus of elasticity – Poisson's ratio, stress-strain diagram - factors affecting modulus of elasticity, beam: expression for bending moment – depression of cantilever (Theory and Experiment), Young's modulus: uniform bending (Theory and Experiment) – non-uniform bending (qualitative).

THERMAL PHYSICS

9

Review of thermal properties: specific heat capacity- thermal capacity, modes of heat transfer, thermal conductivity- Lee's Disc method (theory and experiment), conduction through compound media (series and parallel), thermal expansion of solids – bimetallic strip, application: thermostat.

QUANTUM MECHANICS

9

Blackbody radiation – Planck's theory of radiation (derivation) – Wien's law – Rayleigh-Jean's law, photo-electric effect: determination of Planck's constant, matter waves – de-Broglie's hypothesis – wavefunction and its physical significance, Schrödinger wave equation – time-dependent and time-independent, applications: Transmission Electron Microscope (TEM).

LASERS AND FIBRE OPTICS

9

LASER: characteristics of LASER – Einstein's A and B coefficient (derivation) – population inversion – pumping actions, types: Nd-YAG LASER- industrial and medical applications of LASER.

Fibre Optics: propagation of light in optical fibers - total internal reflection – critical angle - numerical aperture and acceptance angle, types of optical fibers (material, refractive index and mode), application: fiber optic displacement sensor.

PHYSICS OF MATERIALS

9

Magnetic materials: magnetic dipole moment – Bohr magneton – magnetic permeability and susceptibility – classification of magnetic materials (dia, para, ferro), Ferromagnetic materials –



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Department of Physics



Domain theory - hysteresis behavior of ferromagnetic materials – soft and hard magnets.

Dielectric materials: dipole moment – permittivity –polarization - types–Langevin- Debye equation - total polarization– dielectric capacitors.

Superconductors: Properties: Meissner's effect, critical temperature, fields and heavy current, types, BCS theory (qualitative) - applications: Magnetic levitation.

Total: 45 Periods

Experiments:

30 Periods

1. Determination of Young's modulus of a beam by uniform bending method.
2. Determination of thermal conductivity of poor conductor by Lee's disc method.
3. Determination of Planck's constant by Photoelectric effect.
4. Determination of wavelength of laser using grating.
5. Determination of acceptance angle and numerical aperture of an optical fiber.
6. Determination of retentivity and coercivity of ferromagnetic material.

THEROY: 45 PERIODS, PRACTICALS: 30 PERIODS, TOTAL: 75 PERIODS

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs
CO1	Explain and describe the fundamental principles, laws, and concepts related to: elasticity, bending of beams, heat transfer, thermal conductivity, expansion, Planck's theory, photoelectric effect, Schrödinger equation, Lasers and Fibre Optics, magnetic, dielectric, superconducting materials	L1, L2	
CO2	Apply physical laws and mathematical formulations of elasticity, heat transfer, quantum theory, laser principles, fibre optics, and material properties to solve engineering-oriented numerical problems and theoretical applications.	L3	PO1
CO3	Analyze physical phenomena and engineering systems by interpreting stress-strain behavior, heat conduction models, quantum radiation laws, wave equations, laser mechanisms, fibre optic propagation, and magnetic/dielectric material responses.	L4	PO2
CO4	Design conceptual models and propose engineering solutions based on principles of elasticity, thermal management, quantum mechanics applications-TEM, laser systems, fibre optic sensors, and advanced functional materials for technological applications.	L5,L6	PO3
CO5	Perform experiments, record data, interpret results, and communicate findings effectively while adhering to ethical and safety standards in laboratory practice.	L4, L5, L6	PO2, PO5, PO4, PO6, PO7, PO8, PO9, PO11

Text Books:

1. M. N. Avadhanulu, P. G. Kshirsagar, and T. V. S. Arun Murthy, A Textbook of Engineering Physics, 11th Edition, S. Chand & Company Pvt. Ltd., New Delhi, 2018.



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Department of Physics



2. Arthur Beiser, Shobhit Mahajan, and S. Rai Choudhury, Concepts of Modern Physics, 6th Edition, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2003.
3. B. B. Laud, Introduction to Electrodynamics and Optics, Wiley Eastern Limited, New Delhi.
4. R. S. Gambhir, Physics of Materials, Tata McGraw-Hill Publishing Company Limited, New Delhi.
5. S. O. Pillai, Solid State Physics, 7th Edition, New Age International Publishers, New Delhi, 2015.

Reference Books:

1. Robert Eisberg and Robert Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, Wiley, New York, 1985.
2. B. B. Laud, Lasers and Nonlinear Optics, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, 2011.
3. J. A. Stratton, Introduction to Electromagnetic Theory, McGraw-Hill Book Company, New York, 1941.
4. C. K. Sharma, Fiber Optics and Optoelectronics, Dhanpat Rai & Co. (P) Ltd., New Delhi.
5. N. Subrahmanyam, Brijlal, and P. S. Hemne, Heat, Thermodynamics and Statistical Physics, 1st Edition, S. Chand & Company Pvt. Ltd., New Delhi, 2008.
6. John M. Senior, Optical Fiber Communications: Principles and Practice, 3rd Edition, Pearson Education, London, 2010

e-resources:

1. <https://nptel.ac.in/courses/122106093>
2. <https://nptel.ac.in/courses/115106060>
3. <https://ocw.mit.edu/courses/8-05-quantum-physics-ii-fall-2013/>

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	1	-	1	3	1	3	1	2	-	1	-	-	-

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By:

Name & Designation:

1. Dr. R. Bakkiyaraj, Associate Professor & Head / Physics,
2. Mr. A. Anandakumar, Assistant Professor /Physics
3. Dr. S. Santhosh, Assistant Professor /Physics

Approved by BoS
Date: 12/03/2026

HoD/Physics 12/3/2026

Dr.R.BAKKIYARAJ, M.Sc., M.Phil., B.Ed., Ph.D.,
Associate Professor & Head,
Department of Physics,
Government College of Engineering,
BARGUR-635104 Krishnaoiri Dt, Tamilnadu.

**GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104**

(Autonomous institute affiliated to Anna University, Chennai)

**Department of Chemistry**

Course code	25YBS104	Course Title	Chemistry
Category	Basic Science	L-P-T-C	3-2-0-4
Regulation	R-2025	Semester	01
Prerequisites	Nil		

Course Objectives:

1. To recognize the fundamentals of spectroscopy, polymers, electrochemistry, corrosion and various types of sensors.
2. To understand the principles of water treatment methods, electrochemical reactions, mechanism of corrosion, polymers properties and principles of sensor.
3. To equip students to apply the acquired basic knowledge of science in solving engineering problems.
4. To enable the students to analyze corrosion environment, differentiate between properties of polymers and factors influencing sensor efficiency.
5. To learn evaluation of EMF, appropriate sensor technologies and interpretation of experimental data for real time applications.

SPECTROSCOPY**Theory: 9 hours; Practicals: 6 hours**

Introduction - Electromagnetic spectrum - Fundamentals of spectroscopy - Beer Lambert's law (problems) - Instrumentation, working principle and applications of UV-Visible spectrophotometer, Atomic Absorbance Spectrophotometer and Flame photometer.

Practicals:

- Estimation of iron content of the given sample using UV-Visible Spectro photometer.
- Estimation of sodium present in water sample using flame photometer.
- Demonstration of Atomic Absorption Spectroscopy (AAS).

CHROMATOGRAPHY**Theory: 9 hours; Practicals: 6 hours**

Chromatography: Introduction - Instrumentation, working principle and applications of Paper chromatography, Gas liquid Chromatography and High-Performance Liquid Chromatography (HPLC) - limitations of chromatography - recent advances and innovations in chromatography (AI and Green chemistry principles in chromatography).

Practicals:

- Demonstration of paper chromatography by simple experiment (Ink/food coloring)
- To study the components, present in given sample using GCMS.

ELECTROCHEMISTRY AND CORROSION**Theory: 9 hours; Practicals: 6 hours**

Electrochemistry: Reversible and irreversible cells - EMF - single electrode potential - Nernst equation (Problems) - reference electrode - calomel electrode - glass electrode and measurement of pH - electrochemical series and its applications.

Corrosion: Corrosion - dry corrosion and its mechanism - Pilling Bedworth rule - electrochemical corrosion and its mechanism - types (galvanic, pitting) - factors influencing corrosion - corrosion control methods - sacrificial anode method - impressed current method.

Practicals:

- To Determine the EMF of the cell by Poggendorff compensation method.
- Conductometric titration: Strong acid (HCl) vs Strong base (NaOH).
- Measurement of pH using glass electrode (pH titration).
- Observe the type and rate of corrosion by comparing the effects of different solutions (tap water, salt water and acid) on different metal samples (Fe, Cu, Zn).

POLYMERS AND COMPOSITES**Theory: 9 hours; Practicals: 6 hours**

Polymers: Classification - functionality - degree of polymerization - types (addition, condensation, co-polymerization) - thermoplastics and thermosetting plastics - free radical mechanism - preparation, properties and applications of individual polymers (PVC, Polyimide, epoxy resin). **Composites:** definition - types polymer matrix composites - Fibre Reinforced Polymers - silicone composites - applications.

Practical:

- Determination of molecular weight of polymer using Ostwald viscometer.
- Identification of thermoplastics and thermosetting plastics.
- Fabricate a simple composite panel using layers of fabric (like fiberglass) and resin. Measure the tensile strength of composite. Compare the properties of composites made with different types of resins.

CHEMICAL SENSORS AND SURFACE CHEMISTRY Theory:9 hours; Prac:6 hours		
Chemical sensors: Definition – structure of chemical sensors - types: Electrochemical sensors, Optical sensors, Mass based sensors, Thermal sensors and semiconductor sensors – application of chemical sensors in cyber security. Surface chemistry: Adsorption: definition, types – working principle of surface chemistry in chemical sensors - surface chemistry mechanism of gas sensors - factors influencing effectiveness of sensors – surface chemistry applications in cyber security - Future trends: nanomaterials – graphene, carbon nanotubes and MOF – surface properties.		
Practicals: - Chemical sensor experiment: pH sensing with natural indicators (red cabbage juice - various household liquids like lemon juice, vinegar, pure water, etc.) - Indoor Air Quality sensor: CO₂, Humidity, Temperature and Velocity.		
Theory: 45 Periods; Practicals: 30 Periods		TOTAL: 75 PERIODS
Upon successful completion of this course, student will be able to,		
CO	Course Outcome	Bloom's Level
CO1	Recall the basic concepts of analytical techniques, corrosion, polymers, and fundamental concepts of chemical sensors.	L1
CO2	Knowledge in surface chemistry helps students to better understand the principles of hardware-based security features, such as the physical integrity of a Trusted Platform Module (TPM) chip that stores encryption keys.	L2
CO3	apply theoretical knowledge of applications and limitations of analytical techniques used in data storage.	L3
CO4	analyze appropriate chemical sensor technologies to prevent cyber threats (unauthorized access, data breaches, etc.,).	L4
CO5	Evaluate corrosion control techniques, suitable polymers for engineering applications and effectiveness of chemical sensors.	L5

Text Books:

1. P. C. Jain and Monica Jain, "Engineering Chemistry" 17th edition, Dhanpat Rai Publishing Co., 2023.
2. S.S.Dara, S.S.Umare, Aruna M Sudame, "A Textbook of Engineering Chemistry", 1st edition, S Chand and Company Ltd., 2024.

Reference Books:

1. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", 2nd Edition, Cambridge University Press, Delhi, 2019.
2. Douglas A Skoog, Donald M, West "Fundamentals of Analytical Chemistry", 10th edition, Cengage, 2022.
3. Mohamed M. Chehimi and Jean Pinson, "Applied Surface Chemistry of Nanomaterials" Nova Science Pub Inc, 2013. (ISBN: 978-1-62808-351-4).
4. V.R.Gowariker, N.V.Viswanathan, Jayadev Sreedhar, "Polymer Science", 5th edition, New Age International Private Limited, 2023.
5. Jiri Janata, "Principles of Chemical Sensors" 2nd edition, Springer, 2017.

COURSE ARTICULATION MATRIX											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2	3	2	1			1	2	3			
CO3	3	1		3	1			3			
CO4	3	1			1	1	1	3			
CO5	3		1		2	1	1	3			

Correlation Levels: 3 – Strong, 2 – Medium, 1 – Low and (-) No correlation

Course Designed by

- (1) Dr.G.SARASWATHY,
ASP & Head/Chemistry.
- (2) Dr.S.ELUMALAI, AP/Chemistry.

BoS Approval

Date: 12.03.2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Computer Science and Engineering



Subject Code	25ZES105	Subject Title	PROGRAMMING IN C
Category	Engineering Sciences	L-T-P-C	3-0-0-3
Regulation	2025	Semester	II
Prerequisites	Awareness of elementary mathematical concepts such as arithmetic operations and logical reasoning.		

Course Objectives:

1. To impart fundamental knowledge about C programming, enabling students to solve engineering and real-world problems algorithmically.
2. To develop modular programming abilities in students using control structures, arrays, functions, pointers, and file operations.
3. To nurture analytical, debugging, and problem-solving skills relevant to contemporary engineering and technology applications.

Course Content:

Problem Solving and Fundamentals of C Programming

(9 Hours)

Introduction to Problem Solving - Problem-solving concepts, Programming logic, Program Design Representation – Algorithm, Pseudocode, Flowchart.

History of C - Programming paradigms - C program structure - Data types - Variables - Operators - Expressions - Input/Output - Control statements - Preprocessor directives - Compilation process.

Arrays and Strings

(9 Hours)

Declaration and initialization - 1D/2D arrays - Array operations - String operations (length, compare, concatenate, copy) - Sorting (bubble, selection) - Searching (linear, binary)

Functions and Pointers

(9 Hours)

Modular programming - User-defined and built-in functions - Recursion, Pointers and pointer arithmetic - Parameter passing - Arrays and pointers - Array of pointers.

Structures, Unions and Dynamic Memory

(9 Hours)

Structures & nested structures - Unions - Array of structures - Self-referential structures - Pointers with structures - Dynamic memory allocation (malloc, calloc, realloc, free) - Storage classes - Visibility - Typedef.

File Processing and Advanced Topics

(9 Hours)

File operations (open, read, write, close) - Types of file processing (sequential/random access) - Standard I/O - Command line arguments - Error handling in C (using errno, perror(), strerror(), error codes)

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs mapped
CO1	Explain problem-solving strategies, C program structure, data representation, and the role of arrays, functions, structures, dynamic memory, and files in solving computational problems.	L2	-
CO2	Implement modular C programs using arrays, strings, functions, pointers, dynamic memory allocation, and file operations to solve real-world problems.	L3	PO1, PO2, PO3



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Computer Science and Engineering



CO3	Analyze C programs involving sorting/searching techniques, pointer manipulation, structured data, memory usage, and file processing to identify errors, optimize performance, and improve reliability.	L4	PO1, PO2, PO3, PO4, PO5
CO4	Evaluate alternative program designs and data handling techniques—such as recursion vs iteration, static vs dynamic memory, arrays vs structures, and sequential vs random file access—to select appropriate solutions.	L5	PO1, PO2, PO3, PO4, PO5
CO5	Prepare and deliver a technical seminar on C programming applications by integrating problem-solving techniques, arrays, functions, pointers, structures, dynamic memory management, file processing, and error-handling concepts.	L6	PO3, PO5, PO8, PO9, PO10, PO11

Text Books:

1. E. Balagurusamy, "Programming in ANSI C", McGraw Hill, 9th Edition, 2024.
2. Yashavant Kanetkar, "Let Us C", BPB Publications, 20th Edition, 2024.

Reference Books:

1. Reema Thareja, "Data Structures Using C", Oxford University Press, 3rd Edition, 2025.
2. B.W. Kernighan and D.M. Ritchie, "The C Programming Language", Prentice Hall, 2nd Edition, 1988.
3. Greg Perry & Dean Miller, "C Programming Absolute Beginner's Guide", Que Publishing, 3rd Edition, 2013.
4. Stephen G. Kochan, "Programming in C", Addison-Wesley, 3rd Edition, 2004.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	-
CO4	2	3	3	2	3	-	-	-	-	-	-	3	1	-
CO5	-	-	2	-	2	-	-	2	2	3	1	2	1	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.J.Nafeesa Begum,
Professor/CSE

BOS Approval

Date:



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of CSE - CYBER SECURITY



Subject Code	25YPC106	Subject Title	PROBLEM SOLVING TECHNIQUES
Category	Professional Core	L-P-T-C	3-0-0-3
Regulation	2025	Semester	I
Prerequisites			

Course Objectives:

1. Students will be able to define problems clearly and accurately.
2. Students will be able to apply various problem-solving strategies.
3. Students will be able to develop and evaluate potential solutions.
4. Students will be able to implement solutions effectively, monitor and improve problem - solving processes.
5. Students will develop critical thinking and analytical skills.

Course Content:

[INTRODUCTION]

(10 Hours)

Introduction: Notion of algorithms and programs – Requirements for solving problems by computer– The problem-solving aspect: Problem definition phase, getting started on a problem, The use of specific examples, Similarities among problems, working backwards from the solution – General problem-solving strategies - Problem solving using top-down design.

Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of set of numbers - Factorial computation - Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.

[FACTORING METHODS]

(9 Hours)

Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers - Raising a number to a large power – Computing the n^{th} Fibonacci number.

[ARRAY TECHNIQUES]

(9 Hours)

Array order reversal – Array counting or histogramming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the k^{th} smallest element – Longest monotone subsequence.

[MERGING, SORTING AND SEARCHING]

(9 Hours)

The two-way merge, sorting by selection, sorting by exchange, sorting by Insertion, Linear search, binary search.

[TEXT PROCESSING AND PATTERN SEARCHING]

(8 Hours)

Text line length adjustment – Left and right justification of text – Keyword searching in text –Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi – Permutation generation.

Total Hours: 45



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of CSE - CYBER SECURITY



Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Recall and explain the fundamental concepts of computational thinking, including problem-solving strategies, algorithmic structures for factoring, array manipulation, searching/sorting, and text processing techniques.	L1, L2	-
CO2	Apply systematic problem-solving strategies, including top-down design and algorithmic logic, to implement efficient solutions for computational tasks involving numerical factoring, array manipulation, data searching/sorting, and text processing.	L3	PO1
CO3	Analyze and compare the efficiency and suitability of various computational strategies—including factoring methods, array manipulations, sorting/searching techniques, and recursive patterns—to determine the optimal approach for diverse problem-solving scenarios.	L4	PO2
CO4	Design and construct optimized algorithmic solutions for complex computational challenges by synthesizing top-down design principles, advanced factoring logic, multi-dimensional array structures, and recursive text-processing patterns to meet specific performance requirements.	L5	PO3
CO5	Collaborate effectively in teams to investigate complex computational problems, utilizing modern algorithmic tools and project management principles to design, document, and communicate ethical, socially-responsible solutions for real-world text and data challenges.	L3-L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. R.G. Dromey, "How to Solve it by Computer", First Edition, Pearson, 2006.

Reference Books:

1. Reema Thareja, "Fundamentals of Computers", Second Edition, Oxford University Press, 2020.
2. A B Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020.
3. Thomas H. Coremen , "Algorithms Unlocked", The MIT Press, 2013.
4. Michael Schneider, Steven W. Weingart, David M. Perlman, "An Introduction to Programming and Problem Solving with Pascal", Second Edition, Wiley India ,2011.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	1	-	1	2	-	1	3	2	1
CO3	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO4	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO5	1	1	1	2	-	1	-	1	2	-	1	3	3	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By


Dr.K. Kumar

Associate Professor

Name & Designation


BOS Approval

Date: 05/06/2025

UNIT V FILES, MODULES, PACKAGES

9

Files and exception: text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages; illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.

CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and looping for solving problems.

CO4: Decompose a Python program into functions.

CO5: Represent compound data using Python lists, tuples, dictionaries etc.

CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Kari Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press 2021
4. Eric Matthes, "Python Crash Course, A Hands-on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. <https://www.python.org/>
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

SEM 2 25Z MC107

தமிழர் மரபு

LTPC
1 001

அலகு I - மொழி மற்றும் இலக்கியம்:

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு - பாரை ஒவியங்கள் முதல் நவீன ஒவியங்கள் வரை - சிற்பக் கலை: 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் கிணைக் கோட்பாடுகள்: 3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunal Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Computer Science and Engineering



Subject Code	25ZES107	Subject Title	Programming In C Laboratory
Category	Engineering Sciences	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	I
Prerequisites	The ability to understand basic program flow, such as sequence, selection (decision-making), and iteration (loops).		

Course Objectives:

1. Develop practical programming skills in C language through hands-on coding exercises.
2. Enhance problem-solving ability by implementing algorithms and data manipulation using C.
3. Foster debugging, testing, and optimization techniques in real-world C programming scenarios.

Course Content:

1. Calculate simple and compound interest.
2. Find the largest of three numbers using if-else statements.
3. Check whether a number is prime or not.
4. Calculate the factorial of a number using recursion.
5. Perform basic arithmetic operations (addition, subtraction, multiplication, division) using switch-case.
6. Find the sum and average of elements in an array.
7. Perform linear and binary search on an array.
8. Sort an array using selection sort.
9. Reverse a string without using library functions.
10. Program using functions to find the GCD (Greatest Common Divisor) of two numbers.
11. demonstrate pointer usage including pointer arithmetic.
12. Create, initialize, and display elements of a structure.
13. Dynamically allocate memory to an array and perform operations.
14. Read from and write to a file (file handling).
15. Count Characters, Words, and Lines in a File.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the working of conditional statements, loops, arrays, strings, functions, and recursion used in solving simple computational problems.	L2	-
CO2	Develop and implement C programs using decision-making statements, loops, arrays, functions, searching, sorting, and recursion to solve real-world problems.	L3	PO1, PO2, PO3, PO5



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Department of Computer Science and Engineering



CO3	Analyze and debug C programs involving pointers, structures, dynamic memory allocation, and file handling to identify errors and improve program efficiency.	L4	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Evaluate and compare different programming approaches such as recursion vs iteration, static vs dynamic memory, and linear vs binary search to select appropriate solutions.	L5	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Prepare and deliver a technical seminar on C programming applications by integrating core programming concepts and effective technical communication skills.	L6	PO8, PO9, PO10, PO11

Course Articulation matrix:

CO	Program Outcomes (PO)											PEO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	3	3	2	-	2	-	-	-	-	-	-	2	-	-
CO3	3	3	3	2	2	3	-	-	-	-	-	2	2	-
CO4	2	3	3	2	2	2	-	-	-	-	-	3	2	1
CO5	-	-	-	-	-	-	-	2	2	3	1	2	1	-

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.J.Nafeesa Begum,

Professor/CSE

BOS Approval

Date:



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of CSE - CYBER SECURITY



Subject Code	25YPC111	Subject Title	PROBLEM SOLVING TECHNIQUES LABORATORY
Category	Professional Core	L-P-T-C	0-0-3-1.5
Regulation	2025	Semester	I
Prerequisites			

Course Objectives:

1. To develop algorithms and programs for mathematical computations such as factorial series, trigonometric functions, Fibonacci and Lucas sequences.
2. To apply iterative and recursive methods in solving numerical and sequence generation problems.
3. To design and implement algorithms using arrays for rearrangement, merging, and duplicate removal operations.
4. To understand and compare searching and sorting techniques such as binary search, quicksort, and their refinements.
5. To practice text and pattern processing algorithms for substring search, replacement, and keyword frequency counting.

LIST OF EXPERIMENTS:

1. Find the sum of the first n terms of the series

$$f_s = 0! + 1! + 2! + 3! + \dots + n! \quad (n \geq 0)$$

2. Evaluate the function $\cos(x)$ as defined by the infinite series expression

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

The acceptable error for the computation is 10^{-6} .

3. The first few numbers of the Lucas sequence which is a variation on the Fibonacci sequence are:

1 3 4 7 11 18 29 ...

Generate the Lucas sequence.

4. Generate the sequence where each member is the sum of adjacent factorials, i.e.

$$f_3 = 1! + 0!$$

$$f_4 = 2! + 1!$$

$$f_5 = 3! + 2!$$

Note that by definition $0! = 1$.

5. Find the integer whose square is closest to but greater than the integer number input as data.
6. Compute the reciprocal of a number.
7. Calculate the n^{th} Fibonacci number. Compare the performance of the recursive method with the iterative solution.



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Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Apply systematic problem-solving strategies to design and implement efficient algorithms for mathematical computations, sequence generation, array manipulations, and text processing, while evaluating performance through iterative and recursive implementations essential for algorithmic foundations in Cyber Security.	L3	PO1, PO8, PO9
CO2	Analyze and evaluate computational problems by deconstructing mathematical series, sequence generation logic, array manipulation techniques, and pattern-matching algorithms to determine the most efficient iterative, recursive, or refined structural solutions suitable for secure data processing and cryptographic applications.	L3	PO2, PO8, PO9
CO3	Design and construct modular algorithms to solve complex mathematical series, iterative and recursive numerical sequences, and sophisticated array structures involving element rearrangement and duplicate elimination strategies for optimized data organization.	L6	PO3, PO8, PO9
CO4	Design and evaluate optimized search strategies and refined sorting algorithms using median-based partitioning, while constructing robust pattern-matching and replacement logic for efficient text processing and data retrieval.	L6	PO3, PO8, PO9
CO5	Investigate complex algorithmic problems by conducting experiments to compare the performance of recursive versus iterative solutions and refined sorting techniques, while utilizing modern tools to design and implement efficient data processing and pattern-matching systems, adhering to ethical programming standards, and demonstrating effective communication and collaborative project management.	L4, L5	PO2, PO4, PO5, PO8, PO10, PO11



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Department of CSE - CYBER SECURITY



Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	3	2	-	-	-	-	-	2	2	-	-	2	2	-
CO2	3	2	-	-	-	-	-	2	2	-	-	2	2	-
CO3	3	2	-	-	-	-	-	1	3	-	-	2	2	-
CO4	3	3	-	-	-	-	-	2	3	-	-	3	3	-
CO5	3	3	-	2	2	-	-	2	3	2	2	3	3	2

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 05/06/2025

SEMESTER - II



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of English



Subject Code	25ZHS201	Subject Title	English for Engineers-II
Category	HSMC	L-T-P-C	3-0-0-3
Regulation	2025	Semester	II
Prerequisites	Specific technical vocabulary and familiarity with document structures like reports, manuals, proposals and reviews.		

Course Objectives:

1. To equip students with the ability to draft clear and accurate product descriptions, formal responses to complaints using effective error analysis techniques.
2. To foster proficiency in high-stakes speaking scenarios with a focus on correct intonation and public speaking styles.
3. To master advanced grammatical structures and distinguish between British and American English and Engineering Terminology.
4. To enable students to synthesize information for technical proposals, event reports, film or book reviews and also engaging in modern digital formats like technical blogs.
5. To train learners in the preparation of professional resumes, job and internship applications, and the construction of both formal and informal letters for diverse professional contexts.

Course Content:

[BASICS OF LANGUAGE] (9 Hours)

Infinitives - Plain Infinitive – Participles – Gerund – Difference in British and American English – Engineering Terminology – Impersonal Passive Voice – Prepositional Phrases – Idioms and Phrases

[WRITING DESCRIPTIONS] (9 Hours)

Errors Analysis - Airline/Train Announcement – Weather Forecast Report – Product Description – Advertisement Preparation – Writing Responses to Complaints – Enquiring about a course over phone.

[ORAL COMMUNICATION] (9 Hours)

Intonation – Oral Presentation – Extempore speech- Difference between Lecture and Public Speech - Role Play (Interview/ Telephone Interview)

[TECHNICAL WRITING] (9 Hours)

Technical Essay writing –Case study-- Letter Writing (Formal and Informal) – Job / Internship Application – Resume preparation- Compare and Contrast essay.

[NARRATION AND SUMMATION] (9 Hours)

Writing Vision and Mission Statement - Short Report on an Event (Field Trip, Internship Report etc.) – Writing Articles in Technical Blogs – Letter to Editor –Writing Proposals – Film/Book Reviews.

Total Hours: 45



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104
(Autonomous institute affiliated to Anna University, Chennai)
Department of English



Upon successful completion of this course, students will be able to:

CO	COURSE OUTCOMES	Bloom's Level
CO1	Recall and identify engineering terminology, idioms, and grammatical structures such as the impersonal passive voice and prepositional phrases.	L1
CO2	Explain industrial processes and interpret technical data to write accurate product descriptions and weather forecast reports.	L2
CO3	Demonstrate professional oral communication through extempore speech, presentations, and role-playing in interview scenarios.	L3
CO4	Analyze case studies and distinguish between formal and informal letter structures to draft appropriate internship applications and resumes.	L4
CO5	Appraise and critique technical traits and events to justify solutions in film/book reviews, structured technical proposals and project reports in a planned and logical manner and technical blog articles.	L5

TEXT BOOK:

1. Aruna Koneru, "English Language Skills for Engineers", McGraw Hill Education (India) Private Ltd 2020.

REFERENCES BOOKS:

1. Bailey, Stephen. *Academic Writing: "A Practical guide for students"* New York: Rutledge, 2018. Pearson. 2019.
2. Sudarshana, N.P. and Savitha, C, "English for Engineers" Cambridge University Press, 2018.
3. Zinsser, William "On Writing Well" Harper Resource Book, 2001.
4. Hamp-Lyons, L "Study writing" Cambridge University Press, 2006.

E-resources:

1. innovate.ieee.org/ieee-english-for-technical-professionals/
2. onlinecourses.nptel.ac.in/noc20hs56/preview
3. swayam.gov.in
4. [cambridge english for engineering](http://cambridge.englishforengineering.org)



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Department of English



Course Articulation Matrix:

CO	Program Outcomes										
	1	2	3	4	5	6	7	8	9	10	11
CO1	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	2	-
CO4	-	-	-	-	-	-	-	-	3	-	2
CO5	-	-	-	-	-	-	-	-	3	-	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

[Signature]
12/3/2026

Course Designed By

Dr. A. Jesu Steephan Samy. AP/Eng.

[Signature]
12/3/2026
BOS Approval

Date: 12.03.2026



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Mathematics



Subject Code	25ZBS202	Subject Title	RANDOM PROCESSES AND LINEAR ALGEBRA
Category	Basic science	L-P-T-C	3-0-1-4
Regulation	2025	Semester	II
Prerequisites	Basic knowledge of calculus, matrices, and fundamental probability concepts.		

Course Objectives:

1. To introduce the basic notions of vector spaces which will then be used to solve related problems.
2. To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
3. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
4. To provide necessary basics in probability that are relevant in applications such as random signals, linear systems in communication engineering.
5. To understand the basic concepts of probability, one and two-dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.

Course Content:

[PROBABILITY AND RANDOM VARIABLES] (9+3)

Axioms of probability – Conditional probability – Baye's theorem – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable.

[TWO – DIMENSIONAL RANDOM VARIABLES] (9+3)

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

[RANDOM PROCESSES] (9+3)

Classification – Stationary process – Markov process – Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations (Statement only) – Limiting distributions

[VECTOR SPACES] (9+3)

Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

[LINEAR TRANSFORMATION AND INNER PRODUCT SPACES] (9+3)

Linear transformation – Null spaces and ranges – Dimension theorem – Matrix representation of a linear transformations – Inner product – Norms – Gram Schmidt orthogonalization process – Adjoint of linear operations – Least square approximation.

Total Hours: 60

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level
CO1	Recall axioms of probability, standard distributions, definitions of random processes, vector spaces, linear transformations, and inner product concepts.	L1
CO2	Explain probabilistic models, joint and marginal distributions, Markov processes, and limiting behavior of random systems. Interpret the structure of vector spaces, linear mappings, orthogonality, and least squares approximation.	L2



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Department of Mathematics



CO3	Compute probabilities, moments, regression coefficients, and apply standard distributions to solve problems. Determine bases, dimensions, matrix representations, orthogonal sets using Gram-Schmidt, and least square solutions.	L3
CO4	Examine dependence between random variables using covariance and correlation, and analyze Markov chain behavior. Test linear independence, compare subspaces, evaluate null space and range, and verify the Dimension theorem.	L4
CO5	Justify appropriate probability models, distributions, or stochastic processes for real-life situations. Assess the effectiveness of linear transformations, orthogonalization methods, and least squares approximations in problem solving.	L5

Text Books:

1. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student 4th Edition, 2014.
2. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.
3. Friedberg, A.H., Insel, A.J. and Spence, L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

Reference Books:

1. Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
2. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
3. Yates, R.D. and Goodman, D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
4. Kolman, B. Hill, D.R., "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint, 2009.
5. Kumaresan, S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010

Course Articulation matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	1	2	2	1	1	-	-	1	-
CO2	3	3	1	3	2	1	-	-	-	1	-
CO3	3	3	2	3	3	1	1	-	-	1	-
CO4	3	3	2	2	2	-	-	-	-	1	-
CO5	3	3	3	3	3	-	-	-	-	1	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

S. G. Prakash
S. G. Prakash/AP(T)/MAT

BOS Approval

Date:



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Science and Humanities



Subject Code	25ZBS203	Subject Title	Physics For Information Science
Category	Basic Science	L-P-T-C	3-0-0-3
Regulation	2025	Semester	II (CSE & CSE-CS)
Prerequisites	Fundamental understanding of basic physics principles and laws, Knowledge of elementary quantum theory and electrical concepts, Basic mathematical skills in algebra, calculus, and differential equations.		

Course Objectives:

1. Provide fundamental knowledge of conducting materials, semiconducting materials, memory and non-destructive testing devices, applied quantum mechanics, and quantum computing, enabling students to understand the basic principles governing electronic materials and modern computational technologies.
2. Enable students to apply the concepts of electrical conduction, semiconductor carrier transport, memory devices, NDT techniques, and quantum mechanical principles to solve basic problems and understand their applications in electronic and nanotechnology systems.
3. Develop the ability to analyze the behavior and performance of conducting and semiconducting materials, memory technologies, and quantum devices, including the effect of temperature, doping, and quantum confinement in modern electronic and computing systems.
4. Equip students with the conceptual ability to design or conceptualize basic electronic and nanoscale devices, such as semiconductor memory devices, tunnel diodes, single electron transistors, and simple quantum circuits.
5. Encourage students to enhance learning through assignments, presentations, seminars, and team-based activities, promoting collaborative learning, communication skills, and the ability to explore emerging topics such as quantum computing, nanotechnology, and advanced electronic devices.

COURSE CONTENT

CONDUCTING MATERIALS

9

Classification of conducting materials, Classical free electron theory: electrical conduction in metals - expression for electrical conductivity - thermal conductivity - Wiedemann - Franz law - Lorenz number - success and failures, quantum free electron theory: Fermi-Dirac statistics- Fermi energy - effect of temperature, density of energy states (derivation), energy bands in solids (qualitative).

SEMICONDUCTING MATERIALS

9

Types of semiconductors - properties, energy band diagram: direct and indirect band gap, Intrinsic semiconductor: carrier concentration - Fermi level, extrinsic semiconductor - carrier concentration of n type and p type semiconductor - Fermi level: temperature and doping concentration.

MEMORY and NDT DEVICES

9

Memory devices: Overview of memory hierarchy, volatile vs non-volatile memory, concepts of semiconductor memories: static RAM - dynamic RAM - ferroelectric RAM, magneto-resistive RAM, applications in embedded systems and consumer electronics.

Non-Destructive Techniques (NDT): introduction, classifications- X-ray testing-ultrasonic testing (UT) -radiographic testing (RT), applications and advantages of NDT: manufacturing industries.

APPLIED QUANTUM MECHANICS

9

Quantum confinement - quantum structures: well, wire, dots, applications in quantum computing, quantum tunneling - tunnel diode, single electron phenomena: Coulomb blockade - single electron transistor, applications in nano-scale logic gates and quantum sensing.



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Department of Science and Humanities



QUANTUM COMPUTING

9

Introduction: quantum mechanics for computation - quantum states – classical bits – quantum bits or qubits- Bloch sphere - superposition – entanglement – single and multiple qubits gates – simple quantum circuits – challenges and advantages of quantum computing.

Total: 45 PERIODS

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs
CO1	Explain the fundamental concepts of conducting materials, semiconducting physics, memory and NDT devices, applied quantum mechanics, and quantum computing including principles, theories, characteristics, and applications.	L1,L2	-
CO2	Apply classical and quantum electron theories, semiconductor carrier statistics, memory device principles, quantum mechanical concepts, and quantum logic to solve theoretical and numerical engineering problems.	L3	PO1
CO3	Analyze electrical conduction mechanisms, semiconductor behavior, performance of memory and NDT techniques, quantum confinement effects, and quantum computational models to interpret engineering performance and technological relevance.	L4	PO2
CO4	Design theoretical models and propose innovative solutions using conducting materials, semiconductor devices, memory technologies, quantum devices, and quantum circuits addressing engineering requirements and sustainability aspects.	L5, L6	PO3, PO4
CO5	Analyze emerging trends and create technical reports, seminar presentations, and collaborative discussions on advanced semiconductor technologies, NDT applications, nano-quantum devices, and quantum computing systems.	L4,L5, L6	PO2, PO4, PO5, PO7, PO8, PO9, PO11

Text Books:

1. S.O. Pillai, Solid State Physics, New Age International (P) Ltd.,
2. M.S. Tyagi, Introduction to Semiconductor Materials and Devices, Wiley Eastern Ltd.,
3. Robert Eisberg, Robert Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Wiley, 2nd Edition, 1985
4. K. Gosser, P. Lugli, D. Ferry, Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices, Springer, 2004
5. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 2nd Edition, 2010.



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Reference Books:

1. Neil W. Ashcroft, N. David Mermin, Solid State Physics, Harcourt Brace Jovanovich, 3rd Edition, 1976.
2. Charles Kittel, Introduction to Solid State Physics, Wiley Publication, 9th Edition, 2018.
3. Donald A. Neamen, Semiconductor Physics and Devices, McGraw-Hill, 4th Edition, 2012.
4. David J. Griffiths, Introduction to Quantum Mechanics, Cambridge University Press, 3rd Edition, 2018.
5. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
6. Donald A. Neamen, Dhrub Biswas, Semiconductor Physics and Devices, McGraw-Hill Education India, 4th edition.

e-resources:

1. <https://nptel.ac.in/courses/115106127>
2. <https://ocw.mit.edu/courses/8-231-physics-of-solids-i-fall-2006/>
3. <https://ocw.mit.edu/courses/8-370-quantum-computation-fall-2001/>

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	1	1	-	2	2	3	-	1	-	-	-

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By:

Name & Designation:

1. Dr. R. Bakkiyaraj, Associate Professor & Head,
2. Mr. A. Anandakumar, Assitant Professor/Physics,
3. Dr. S. Santhosh, Assitant Professor/Physics,

BOS Approval
Date: 12/03/2026

Dr. R. Bakkiyaraj
Dr. R. BAKKIYARAJ, M.Sc., M.Phil., B.Ed., Ph.D.
Associate Professor & Head,
Department of Physics,
Government College of Engineering,
Bargur-635104, Krishnagiri Dt, Tamilnadu.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Mechanical Engineering



Subject Code	25ZES106 / 25YES204	Subject Title	ENGINEERING GRAPHICS
Category	Engineering Science	L-T-P-C	1-0-4-3
Regulation	2025	Semester	I
Prerequisites	NIL		

Course Objectives:

1. To impart knowledge on engineering drawing fundamentals, BIS/ISO conventions, and geometric constructions, enabling students to understand and represent technical information graphically.
2. To develop the ability to visualize and draw orthographic projections of points, lines, planes, solids, sectioned solids, and their surface developments accurately using conventional and CAD tools.
3. To train students in freehand sketching and the application of isometric and perspective projections for effective communication of engineering designs.

Course Content:

PLANE CURVES (3+12 Hours)

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves - *BIS/ISO conventions (Not applicable for SEE & Only for CIE)*.

PROJECTION OF POINTS, LINES AND PLANE SURFACE (3+12 Hours)

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

PROJECTION OF SOLIDS AND FREEHAND SKETCHING (3+12 Hours)

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

Practicing three dimensional modeling of simple objects by CAD Software (Not applicable for SEE & Only for CIE)

PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES (3+12 Hours)

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practicing three dimensional modeling of simple objects by CAD Software (Not



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Department of Mechanical Engineering



applicable for SEE & Only for CIE)

ISOMETRIC AND PERSPECTIVE PROJECTIONS (3+12 Hours)

Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids- Prisms, pyramids and cylinders by visual ray method.

Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not applicable for SEE & Only for CIE)

Total Hours: 90

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Recall and explain the fundamentals of engineering drawing, including BIS/ISO conventions, plane curves, orthographic projection principles, and standard practices for points, lines, planes, and solids.	L1, L2	—
CO2	Apply principles of orthographic projection to construct accurate projections of points, straight lines, plane surfaces, and simple solids using first angle projection and rotating line/object methods.	L3	PO1
CO3	Analyze projections of solids, sectioned solids, and plane surfaces to determine true lengths, true shapes of sections, and correct development of lateral surfaces.	L4	PO2
CO4	Design and draw isometric and perspective projections of simple and combined solids, including truncated forms, adhering to standard drawing conventions and visualization principles.	L5	PO3
CO5	Use CAD tools and freehand sketching techniques collaboratively to model, visualize, and communicate three-dimensional objects effectively for engineering applications. (Only for CIE)	L3–L6	PO4– PO11

Text Books:

1. Natrajan K. V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2016.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2016.
3. Shah, M.B and Rana B. C. "Engineering Drawing and Computer Graphics", Pearson Education, 2010.

Reference Books:

1. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University Press, New Delhi, 2015.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Computer Science and Engineering



Subject Code	25ZES205	Subject Title	Python Programming
Category	Engineering Science	L-P-T-C	3-0-0-3
Regulation	2025	Semester	II
Prerequisites	Basic knowledge of programming concepts such as variables, operators, conditional statements, and loops (in any programming language). Basic logical and mathematical problem-solving skills.		

Course Objectives:

1. To understand the fundamental concepts and principles of Python programming, including syntax, data types, and control structures.
2. To develop python programs using variables, control structures, functions, modules, and file handling.
3. To develop python programs using object-oriented programming concepts.

Course Content:

Introduction to Python

(9 Hours)

Python interpreter and modes – Variables and Data types – Operators – Precedence of operators – Control Flow – Expressions – Iteration – Statements – Tuple assignment – Comments. Illustrative problems: Find minimum and maximum in a list, Insert a card in a list of sorted cards, Towers of Hanoi, Exchange the values of two variables, Circulate the values of n variables, Distance between two points.

Functions, Modules and Packages

(9 Hours)

Functions – Function Definition and use – Function Calls – Flow of execution – local and global scope – Function composition – Recursion – Parameters and arguments – Fruitful Functions and Void Functions – Command line arguments. Modules – User-defined Modules – Packages. Illustrative programs: Factorial, Fibonacci Series, GCD, Exponentiation.

Data Structures in Python

(9 Hours)

Lists: List operations and methods – List Comprehension – Tuples: Tuple Operations and methods – Dictionaries: Dictionary operations and methods – Sets: Set operations and methods – Strings: String operations and methods. Illustrative programs: Selection sort, Insertion sort, Merge sort, Linear Search, Binary Search.

OOP Concepts in Python

(9 Hours)

Classes and Objects – Attributes – Instances – Methods – Inheritance – Polymorphism – Interface. Illustrative programs demonstrating inheritance and polymorphism in Python.

Files and Exception Handling

(9 Hours)

Files: Text files – Opening and Closing Files – Reading and Writing files – Errors and Exceptions – Handling exceptions. Illustrative programs: Word count, Copy file, Merging Files.

Total Hours: 45



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Department of Computer Science and Engineering



Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs mapped
CO1	Remember the concepts of Python programming fundamentals, functions, data structures, object-oriented concepts, and file and exception handling mechanisms and understand their role in developing Python programs.	L1, L2	-
CO2	Apply Python syntax, control flow constructs, functions, data structures, object-oriented features, and file handling techniques to implement solutions for standard programming problems.	L3	PO1, PO2, PO3, PO5
CO3	Use Python modules, packages, recursion, searching and sorting techniques, and file operations to solve computational problems.	L3	PO1, PO2, PO5
CO4	Analyze Python programs involving algorithms, data structures, object-oriented designs, and file/exception handling to examine program structure and execution behavior.	L4	PO2, PO4
CO5	Design and develop Python applications by integrating functions, data structures, object-oriented programming concepts, and file/exception handling.	L6	PO1, PO3, PO5, PO9

Text Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>).
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2", Network Theory Ltd., 2011.

Reference Books:

1. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python : An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.



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Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	-	2	-	-	-	-	-	-	3	2	-
CO3	3	3	-	-	3	-	-	-	-	-	-	3	2	-
CO4	-	3	-	2	-	-	-	-	-	-	-	3	2	3
CO5	3	-	2	-	2	-	-	-	2	-	-	3	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.R.Subathra, AP/CSE

BOS Approval

Date:



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of CSE - CYBER SECURITY



Subject Code	25YPC206	Subject Title	FOUNDATIONS OF CYBER SECURITY
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	II
Prerequisites			

Course Objectives:

1. Recognize the need for information security along with the principles and concepts surrounding it.
2. State the role of security policy, procedures, organization and incident response and how business continuity and disaster recovery play an important part in the context of cybersecurity.
3. Describe the technologies and related concepts that organizations can deploy for enhancing the security of their information assets.
4. Explain the importance of cyber laws and the role of governments and international bodies in the establishment of a legal and sustainable cyber ecosystem.
5. Describe the cybersecurity issues and challenges that have emerged based on the use of e-commerce platforms and digital payments

Course Content:

SECURITY IN AN INTERCONNECTED WORLD

(10 Hours)

Introduction to Information Systems: Evolution and Types of Information Systems - Evolution and Growth of the Internet - Cyberspace and Cybersecurity - Information Security- Information Security Models. **Cybercrime, Cyberattack Tools and Methods, Threat Sources and Cyber Offenders:** Introduction - Classification of Cybercrimes - Forms of Cybercrimes - Cyber Scams and Frauds - Sources of Threats: Threat Actors and their Motivations -Tools and Methods Used in Cyberattacks/Cybercrimes – Cyberattack - Responding to Cyberattacks and the Cyber Kill Chain - Cyberattacks: Organizational Implications - Prevention of Cybercrime -International Efforts to Deal with Cybercrime - National Cybersecurity Policy -Online Code of Conduct and Computer Ethics. **Cybersecurity Vulnerabilities:** Introduction - Security Considerations and Challenges - Types of Vulnerabilities - Vulnerabilities Assessment - Common Vulnerabilities and Exposures (CVE): Institutional Mechanisms

CYBERSECURITY MANAGEMENT AND STRATEGIES AND APPROACHES

(10 Hours)

Cybersecurity Management Practices: Overview of Cybersecurity Management -Information Classification Process - Security Policies - Security Procedures and Guidelines - Security Controls - Security Organization - Incident Response - Business Continuity and Disaster Recovery. **Developing Secure Information Systems:** Introduction - Securing Information Assets - Data Security and Protection - Application Security - Security Architecture and Design - Security Issues in Hardware, Mobile Devices and Internet of Things - Network Security - Operating System Security - Database Security -Techniques/Methods for Data Security and Protection -Issues Related to Digital File Sharing. **Cyber security Strategies and Approaches:** Introduction -Information Security Governance and Risk Management - Cyber Risk Management – Cyber security Frameworks -Cyber Resilience



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Department of CSE - CYBER SECURITY



CYBER LAWS, PRIVACY AND DATA PROTECTION

(9 Hours)

Cyber Laws and Forensics: Need for Cyber Laws and Regulations - Role of International Law and Governments - Challenges for Law-makers and Law Enforcement Agencies – Cyber security Regulations - Cyber Forensics - Cybercrime Techniques -Prevention of Cybercrime and Protection - Cybercrime Investigation-Evidence Collection and Analysis - Intellectual Property Issues in Cyberspace. **Personal Cybersecurity, Privacy and Data Protection:** Introduction - Personal Cybersecurity - Common Causes of Personal Security Breaches - Personal Cybersecurity Best Practices - Privacy Regulations and Cyber security - The Role of Ethics in Cyber security

CYBERSECURITY IN E-COMMERCE AND SOCIAL MEDIA

(8 Hours)

Cybersecurity in E-commerce and Digital Payments: Introduction - E-commerce - Elements of E-commerce Security - E-commerce Security Best Practices - Digital Payments - RBI Guidelines on Digital Payments and Customer Protection - Laws on Privacy and Data Protection for E-commerce Companies. **Overview of Social Media and Security :** Introduction to Social Networks - Types of Social Media and Popular Platforms - Social Media Marketing - Social Media Monitoring - Social Media Privacy - Social Media Privacy Laws and Personal Data Protection - Flagging and Reporting of Inappropriate Content - Laws Regarding Posting of Inappropriate Content - Data Harvesting and Personal Data Protection - Best Practices for the Use of Social Media

CYBER SECURITY TECHNOLOGIES

(8 Hours)

Cyber security Technologies: Introduction - Securing Networks, Web Applications, Services and Servers - Email Security - Antivirus Technologies and Solutions - Identity and Access Management - Authentication - Cryptography - Digital Money, Cryptocurrency - Digital Signatures.

Cyber security in Evolving Technology and Practice: Introduction - Future Challenges in Cyber security - Web 3.0 - Harnessing Artificial Intelligence for Cyber security - Blockchain for Cyber security - Quantum Computing and Cyber security - Combating Advanced Persistent Threats - Digital Trust and Identity Management - 5G Networks and Cyber security - Adopting a 'Secure-by-Design' Approach.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Identify the various types of cybercrimes, threat actors, and vulnerabilities, while explaining the fundamental principles of cybersecurity management, the role of cyber laws and ethics, and the impact of emerging technologies and digital payment regulations on the security of modern information systems.	L1, L2	-
CO2	Apply cybersecurity management practices, security policies, and technical controls to protect information assets, while utilizing cyber law frameworks and e-commerce security best practices to mitigate	L3	PO1, PO5, P11



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	vulnerabilities and respond to organizational threats.		
CO3	Analyze the methodologies used by various threat actors and the effectiveness of different security models, while evaluating the trade-offs between cybersecurity frameworks, privacy regulations, and emerging technologies to determine the optimal defense strategy for an organization.	L4	PO2
CO4	Design and construct a comprehensive cybersecurity framework by synthesizing security policies, risk management strategies, and secure-by-design technological architectures to protect organizational assets against evolving cyber threats and ensure regulatory compliance.	L5	PO3, P11
CO5	Evaluate the societal and legal implications of cybercrimes, emphasizing the role of professional ethics, national policies, and international regulations in creating a sustainable cyber ecosystem, while demonstrating the ability to communicate security risks and manage organizational resilience through effective teamwork and disaster recovery strategies.	L5, L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. **Ajay Singh**, "Introduction to Cybersecurity: Concepts, Principles, Technologies and Practices", Universities Press (India) Pvt. Ltd. April 2024

Reference Books:

1. Kutub Thakur and Al-Sakib Khan Pathan, "Cybersecurity Fundamentals: A Real-World Perspective", First Edition, CRC Press 2020.
2. Charles J. Brooks, Christopher Grow, Philip Craig and Donald Short, "CYBERSECURITY ESSENTIALS", John Wiley & Sons, Inc, 2018.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	2	3	1	1	1	1	1	2	3	1	1
CO3	3	3	2	3	2	1	1	1	1	1	1	3	2	1
CO4	3	2	3	3	1	1	-	-	1	-	2	3	3	2
CO5	1	1	1	1	3	3	3	3	3	3	3	1	1	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation


Course Designed By

Dr. K. Kumar

Associate Professor

Name & Designation



BOS Approval

Date: 12/03/2026.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

25ZMC207.

GE8252

தமிழரும் தொழில்நுட்பமும்

LTPC

1001

அலகு I நெசவு மற்றும் பாணைத் தொழில்நுட்பம்:

3

சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில் நுட்பம்:

3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:

3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

3

அறிவியல் தமிழின் வளர்ச்சி -கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

GE3252

TAMILS AND TECHNOLOGY

**L T P C
1 0 0 1**

UNIT I WEAVING AND CERAMIC TECHNOLOGY

3

Weaving Industry during Sangam Age - Ceramic technology - Black and Red Ware Potteries (BRW) - Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age - Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai).

Department of Mechanical Engineering



Subject Code	25ZES110 / 25ZES208	Subject Title	ENGINEERING PRACTICES LABORATORY
Category	Engineering Science	L-T-P-C	0-0-4-2
Regulation	2025	Semester	I
Prerequisites	NIL		

Course Objectives:

1. To introduce basic manufacturing and fabrication processes such as welding, machining, foundry, and additive manufacturing, and enable students to gain hands-on skills.
2. To expose students to civil engineering practices such as plumbing, woodwork, and construction-related fittings used in domestic and small-scale structures.
3. To familiarize students with fundamental computer operations including hardware assembly, operating system installation, and essential software applications for documentation and data processing

Course Content:

LIST OF EXPERIMENTS

PART I: MECHANICAL ENGINEERING PRACTICES

Welding Work:

1. Welding of Butt Joints, Lap Joints, and Tee Joints using SMAW welding. &
2. Practicing GMAW welding.
3. Practicing GTAW welding.

Basic Machining Work:

1. Simple Turning,
2. Simple Drilling
3. Simple Tapping.

Assembly Work:

1. Assembling a centrifugal pump
2. Assembling a household mixer
3. Assembling an air-conditioner.

Sheet Metal Work:

1. Making of a square tray or Dust Pan or Fabrication of Corner Tray

Additive Manufacturing:

1. Modeling and printing of solid Cone or any shape using 3D printing

Foundry Work:

1. Demonstrating basic foundry operations.



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Department of Mechanical Engineering



PART II: CIVIL ENGINEERING PRACTICES

PLUMBING WORK:

1. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
2. Preparing plumbing line sketches.
3. Laying pipe connection to the suction side of a pump
4. Laying pipe connection to the delivery side of a pump.
5. Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

1. Sawing, Planing
2. Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

1. Studying joints in door panels and wooden furniture
2. Studying common industrial trusses using models.

PART III: COMPUTERS

1. Demonstration of Computer or Laptop Peripherals and Preparation of CPU Block Diagram.
2. Installation of Linux and Windows Operating Systems and Dual Boot Configuration.
3. Document Creation and Formatting using MS Word.
4. Spreadsheet Operations using MS Excel.
5. Presentation Creation using MS PowerPoint.
6. Document Structure and Table Creation using LaTeX.
7. Insertion of Figures, Equations, and References using LaTeX.
8. Newsletter Design using MS Word.

GPA Calculation of Students using MS Excel.

Total Hours: 60

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Addressed
CO1	Identify tools, materials, safety practices, and standard procedures used in plumbing, woodwork, and computer laboratory environments, demonstrating awareness of professional responsibility and safety norms.	L1, L2	PO6, PO7, PO8
CO2	Prepare plumbing line sketches and perform pipe connections	L3	PO1, PO3,



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Computer Science and Engineering



Subject Code	25ZES209	Subject Title	Python Programming Laboratory
Category	Engineering Science	L-P-T-C	0-0-3-1.5
Regulation	2025	Semester	II
Prerequisites	Basic knowledge of programming concepts such as variables, operators, conditional statements, and loops (in any programming language). Basic logical and mathematical problem-solving skills.		

Course Objectives:

1. To write, test and debug simple python programs.
2. To use functions for structuring Python programs.
3. To represent compound data using Python lists, tuples and dictionaries.
4. To implement python programs with conditionals and loops.
5. To read and write data from/to files in Python.

Course Content:

1. Find the maximum and minimum in a list of numbers.
2. Factorial of a number (Iterative and recursive).
3. Generating Fibonacci Series (Iterative and recursive).
4. Compute the GCD of two numbers (Iterative and recursive).
5. Exponentiation (power of a number).
6. Linear search and Binary search.
7. Selection sort and Insertion sort.
8. Merge sort.
9. First n prime numbers.
10. Matrix multiplication.
11. Inheritance.
12. Polymorphism.
13. Programs that take command line arguments.
14. Find the most frequent words in a text read from a file.
15. Merging Files.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs mapped
CO1	Understand fundamental programming constructs, algorithmic approaches, recursion, data structures, object-oriented concepts, and file handling techniques used in Python laboratory programs.	L2	
CO2	Apply iterative and recursive techniques to solve numerical and	L3	PO1, PO2,



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Computer Science and Engineering



	algorithmic problems.		PO3, PO5, PO9
CO3	Use searching, sorting, and matrix processing techniques to implement Python programs for data organization and computation.	L3	PO1, PO2, PO5, PO9
CO4	Analyze Python programs involving command line arguments, file operations, and text processing to examine program structure and correctness of results.	L4	PO2, PO4, PO9
CO5	Design and develop Python programs using object-oriented programming concepts, algorithms, data structures, and file handling.	L6	PO1, PO3, PO5, PO9

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	2	-	2	-	-	-	3	-	-	3	2	-
CO3	3	2	-	-	2	-	-	-	3	-	-	3	2	-
CO4	-	2	-	2	-	-	-	-	3	-	-	3	2	3
CO5	3	-	2	-	2	-	-	-	3	-	-	3	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.R.Subathra, AP/CSE

BOS Approval

Date:



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of English



Subject Code	25ZHS210	Subject Title	Communication English Laboratory
Category	HSMC	L-T-P-C	0-0-2-1
Regulation	2025	Semester	II
Prerequisites	Basic English conversation and varieties in English language.		

Course Objectives:

1. To cultivate confidence in formal and informal speaking scenarios through practical engagement in Just A Minute (JAM) sessions, role plays, and professional telephone etiquette.
2. To refine students' auditory perception and pronunciation by identifying speech sounds, accents through audio-visual tools.
3. To empower students to deliver effective presentations by combining verbal communication with appropriate body language and non-verbal cues to improve overall communicative competency.
4. To train students to extract gist and specific information from academic audio and the speeches of eminent personalities to facilitate effective note-taking and summarization.
5. To equip learners with the ability to perform reading comprehension and produce concise writing using correct punctuation for professional clarity.

Course Content:

[Introduction to Phonetics] (6 Hours)

The Sounds of English (Speech sound -vowels and consonants) - Stress and Intonation - Accent and Rhythm.

[Listening Skills] (6 Hours)

Listening for gist and specific information- listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

[Speaking Skills] (6 Hours)

Self-introduction -Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

[Reading and Writing Skills] (6 Hours)

Reading Comprehension-Précis Writing - E-Mail writing – Punctuation.

[Presentation Skills] (6 Hours)

Verbal and non-verbal communication -Body Language - Making a Presentation.

Total Hours: 30



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of English



Upon successful completion of this course, students will be able to:

CO	COURSE OUTCOMES	Bloom's Level
CO1	Recall and identify the basic sounds of English, including vowels, consonants, stress, and intonation patterns to improve pronunciation.	L1
CO2	Summarize main ideas and interpret specific details from academic audio and speeches by eminent personalities to demonstrate active listening.	L2
CO3	Demonstrate communicative competency by applying telephone etiquette and participating in role plays and JAM sessions.	L4
CO4	Distinguish between various non-verbal communication cues and analyze reading comprehension passages for professional context.	L3
CO5	Appraise and critique oral presentations based on body language and verbal clarity to justify effective communication strategies.	L5

Text Books:

1. "Communication Skills for Engineers and Scientists", PHI Learning PVT.LTD, Delhi, 2014.
2. Dorling Kindersley, "Communication Skills and Soft Skills an Integrated Approach", (INDIA) PVT.LTD, New Delhi, 2012.
3. "Soft Skills", MJP Publishers, Chennai, 2010.

References Books:

1. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw Hill Education Private Limited, New Delhi.
2. "Speak Well" Orient Blackswan Publishers, Hyderabad.
3. Allan Pease, "Body Language" Manjul Publishing House, New Delhi.

E-resources:

1. <https://ve-iitg.vlabs.ac.in/>

Course Articulation Matrix:

CO	Program Outcomes (PO)										
	1	2	3	4	5	6	7	8	9	10	11
CO1	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	2	-
CO4	-	-	-	-	-	-	-	-	3	-	2
CO5	-	-	-	-	-	-	-	-	3	-	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr. A. Jesu Steephany Samy. AP/Eng.

BOS Approval

Date: 12.03.2026

SEMESTER - III



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR-635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Mathematics



Subject Code	25ZBS301	Subject Title	DISCRETE MATHEMATICS
Category	Basic science	L-P-T-C	3-0-1-4
Regulation	2025	Semester	III
Prerequisites	Basic knowledge of set theory, algebraic operations, elementary logic, and mathematical reasoning.		

Course Objectives

1. To understand logical reasoning, propositions, predicates, and proof techniques used in the design and verification of computer programs and algorithms.
2. To apply combinatorial techniques such as counting principles, permutations, combinations, recurrence relations, and the Pigeonhole Principle to solve computational and algorithmic problems.
3. To develop problem-solving skills in number theory concepts such as the Division Algorithm, Chinese Remainder Theorem, and Fermat's Little Theorem, which are useful in cryptography and computer algorithms.
4. To introduce algebraic structures such as semi groups, monoids, groups, rings, and lattices and understand their applications in computer science areas like coding theory, automata, and cryptography.
5. To analyze graph structures and graph models, including connectivity, Euler and Hamiltonian paths, matching, and colouring, which are widely used in computer networks and data structures.

Course Content:

[LOGIC AND PROOFS] (9+3)

Sets – Relations – Functions – Propositional logic – Propositional equivalences – Predicates and quantifiers. – Nested quantifiers – Rules of inference – Introduction to proofs.

[COMBINATORICS] (9+3)

Mathematical induction – Strong induction and well ordering – The basic Counting Principles – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

[NUMBER THEORY] (9+3)

Division algorithm – Euclid's lemma – Euclidean algorithm – Basic properties of congruences – Chinese remainder theorem – Euler-Fermat theorem – Primitive roots.

[ALGEBRAIC STRUCTURES] (9+3)

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphisms – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields – Partial ordering – Posets – Lattices as posets.

[GRAPHS] (9+3)

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamiltonian paths – Matching – Colouring.

Total Hours: 60

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level
CO1	Recall definitions, formulas, and basic concepts of logical propositions, predicates, counting techniques, number theory concepts, algebraic structures, and graph terminology.	L1
CO2	Explain properties of logical reasoning, congruences, counting techniques, recurrence relations, graph models, and algebraic structures such as groups and monoids with examples.	L2



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR-635104

(Autonomous institute affiliated to Anna University, Chennai)

Department of Mathematics



CO3	Apply techniques such as rules of inference, the Pigeonhole Principle, Principle of Mathematical Induction, and the Inclusion-Exclusion Principle to solve problems in combinatorics, number theory, algebraic structures, and graph theory.	L3
CO4	Analyze relationships among logical statements, recurrence relations, number theoretic concepts, algebraic structures, and graph structures to determine connectivity, isomorphism, cosets, and lattice relations.	L4
CO5	Evaluate the validity of mathematical arguments and proofs using rules of inference, and justify conclusions in algebraic structures and graph theory through proper mathematical reasoning.	L5

TEXT BOOKS :

1. Rosen, K.H., "Discrete Mathematics and Its Applications", 7th Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P., and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science", McGraw-Hill Education, New Delhi, Indian Edition, 2017.
3. Burton, D.M., "Elementary Number Theory", 7th Edition, Tata McGraw-Hill Education, 2011.

REFERENCES :

1. Grimaldi, R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, New Delhi, 2007.
2. Koshy, T., "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz, S., Lipson, M., and Patil, V.H., "Discrete Mathematics", Schaum's Outline Series, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, Revised 3rd Edition, 2017.
4. Rosen, K.H., "Elementary Number Theory and Its Applications", 6th Edition, Pearson Education, 2011.

E-resources:

1. <https://nptel.ac.in/courses/106103205>

Course Articulation matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	1	-	-	-	-	-	-
CO4	3	3	2	3	1	-	-	-	-	-	-
CO5	3	3	3	3	1	-	-	-	-	-	-

Correlation Levels: 3- Strong, 2- Medium, 1 -Low, - (dash)-No correlation

Course Designed By

Dr. M. G. Goutham Poorkash
APCD (MAT)

BOS Approval

Date:

12/07/2016



Subject Code	25YPC302	Subject Title	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

Course Objectives:

1. Analyze and Design Combinational Logic: Understand the mathematical and graphical methods (Karnaugh Maps) to simplify and implement combinational circuits such as adders, subtractors, and multiplexers.
2. Develop Sequential Logic Systems: Master the operation of flip-flops and synchronous sequential circuits to design functional registers and counters used in digital systems.
3. Understand Computer Fundamentals: Grasp the Von Neumann architecture, Instruction Set Architecture (ISA), and the fundamental interaction between assembly language and high-level languages.
4. Evaluate Processor Performance: Examine the internal workings of a processor, including data path building, control unit design (hardwired vs. microprogrammed), and the implementation of pipelining to handle data and control hazards.
5. Master Memory and I/O Systems: Explore memory hierarchy, cache mapping, and virtual memory while understanding various I/O interfacing standards like USB, SATA, and DMA for efficient data transfer.

Course Content:

COMBINATIONAL LOGIC

9

Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers - Demultiplexers

SYNCHRONOUS SEQUENTIAL LOGIC

9

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.

COMPUTER FUNDAMENTALS

9

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

PROCESSOR

9

Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.



MEMORY AND I/O

9

Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA

Total Hours : 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom'sLevel	POs Mapped
CO1	Understand: Describe the fundamental operations of combinational and sequential logic, Von Neumann architecture, and the hierarchy of memory systems.	L1,L2	-
CO2	Apply: Implement assembly language instructions and addressing modes to facilitate interaction between high-level languages and machine hardware.	L3	PO1
CO3	Analyze: Examine processor performance by identifying data and control hazards within pipelined architectures and evaluating cache mapping techniques.	L4	PO2
CO4	Design: Develop optimized digital solutions including synchronous sequential circuits, clocked counters, and functional data paths for a control unit.	L5	PO3
CO5	Evaluate: Assess the efficiency of I/O synchronization methods, including DMA and interrupt-driven I/O, and their adherence to interconnection standards like USB and SATA	L5,L6	PO4-PO11

Note:

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. Mano, M.M., & Ciletti, M.D. (2018), "Digital design: With an introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education. (UNIT I & II)
2. Patterson, D. A., & Hennessy, J. L. (2020), "Computer organization and design: The hardware/software interface", Sixth Edition Morgan Kaufmann. (UNIT III, IV and V)



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Reference Books:

1. M.Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
2. Stallings,W, "Computer organization and architecture:Designingforperformance", Tenth Edition, Pearson.Education, 2016.
3. Carl HamachAR, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	1	-	1	2	-	1	3	2	1
CO3	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO4	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO5	1	1	1	2	-	1	-	1	2	-	1	3	3	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

1. TR Sathya Jothi, AP(TEMP)
2. Dr. K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC303	Subject Title	DATA STRUCTURES
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Implement Linear Structures: Enable students to develop and use Stack and Queue Abstract Data Types (ADTs) using array-based implementations for applications like expression evaluation.
2. Master Linked List Variations: Provide a deep understanding of singly, doubly, and circularly linked lists, including basic operations and advanced concepts like Skip Lists and Hashing with collision resolution.
3. Utilize Hierarchical Structures: Teach the implementation and traversal of various tree structures, including Binary Search Trees, AVL Trees, and Heaps for priority queue management.
4. Analyze Network Data: Train students in graph representations (Adjacency Matrix/List) and traversal algorithms like BFS and DFS for both directed and undirected graphs.
5. Apply Advanced Structures to Security: Introduce specialized data structures such as Red-Black Trees, B-Trees, Tries, and Suffix Trees specifically for cyber security applications.
6. Evaluate Performance: Develop the ability to map these technical solutions to Program Outcomes, ensuring students can analyze (L4) and design (L6) efficient data organization strategies.

Course Content:

LINEAR STRUCTURES

(8 Hours)

Arrays based implementations- Stack ADT–Queue ADT–Infix to Postfix Conversion and Expression Evaluation–Double ended queues–Applications.

LINKED LIST STRUCTURES

(10 Hours)

List ADT—linked list implementations—singly linked lists—circularly linked lists—doubly linked lists—Basic operation on list (Insertion, Deletion and List Traversal)—Skip List—Hashing, Analysis of Collision Resolution Techniques—Applications.

NON-LINEAR STRUCTURES

(10 Hours)

Tree ADT – Rooted Trees–Binary Tree ADT – tree traversals–Expression Trees – binary search trees – AVL trees – heaps and Priority Queues using Min/Max Heaps – Tries- Balanced Search Trees–2-4 Trees - Red Black Trees – B Trees–Binomial and Fibonacci Heaps.

GRAPH STRUCTURES

(7 Hours)

Graph ADT – representations of graph– DAG —DFS and BFS in Directed and Undirected Graphs - Euler Circuit -Euler graph -Hamiltonian circuit.



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DATA STRUCTURES FOR CYBER SECURITY APPLICATIONS

(10 Hours)

Stacks and Queues: Secure Buffer Management- Linked Lists: Audit Logs - Priority queues for Event Processing – IDS - Hash Maps – Fast data retrieval, IDS and Storing hashed password tables. Trees : malware classification and Merkle trees for Blockchain integrity. Tries-Compressed Tries and Suffix Trees, Tries for IP Lookup. Graphs: network connections, mapping traffic flow to detect anomalies, Vulnerability analysis.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Understand: Explain the fundamental concepts of linear and non-linear data structures, including their representations in memory and their specific applications in computing.	L1,L2	-
CO2	Apply: Implement various data structures such as stacks, queues, linked lists, trees, and graphs using appropriate programming techniques to solve computational problems.	L3	PO1
CO3	Analyze: Compare the efficiency of different collision resolution techniques in hashing and evaluate various graph traversal algorithms like DFS and BFS for directed and undirected graphs.	L4	PO2
CO4	Design: Construct advanced data structures for specialized fields, such as Interval Trees, Tries, and Suffix Trees, specifically tailored for cyber security applications.	L5	PO3
CO5	Evaluate: Appraise the performance of balanced search trees (AVL, Red-Black, 2-3-4 trees) and heap structures to determine the most effective solution for complex data retrieval tasks.	L5-L6	PO4 – PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. Thomas H.Cormen, Charles E.Leiserson, RonaldL.Rivest,and Clifford Stein, "Introduction to Algorithms", Third Edition, McGraw Hill, 2002.
2. S R Jena and M Dileep Kumar , "Cyber Security using Data Structures", First edition, Notion Press, 2024.



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Reference Books:

1. R.F.Gilberg and B. A.Forouzan, Data Structures: A Pseudocode Approach with C, 2nd Edition, Cengage Learning.
2. E.Horowitz,S.Sahni and Susan Anderson Freed, Fundamentals of Data Structures in C,2nd Edition, Universities Press.
3. A.S.Tanenbaum,Y.Langsam, and M.J.Augenstein,Data Structures using C–PHI/Pearson Education.
4. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, “Data Structures & Algorithms in Python”, An Indian Adaptation, John Wiley & Sons Inc., 2021.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	1	-	1	2	-	1	3	2	1
CO3	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO4	3	3	3	2	-	1	-	1	2	-	1	3	2	1
CO5	1	1	1	2	-	1	-	1	2	-	1	3	3	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

1. TR Sathya Jothi, AP(TEMP)
2. Dr. K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC304	Subject Title	FOUNDATIONS OF DATA SCIENCE
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand the fundamental concepts and facets of the data science process, including data retrieval, preparation, and modelling, to solve complex engineering problems.
2. Apply mathematical and statistical principles to describe data through variables, frequency distributions, and standard (z) scores to reach substantiated conclusions regarding datasets.
3. Analyse relationships between variables using correlation and regression techniques, including multiple regression equations, to predict trends and identify anomalies.
4. Master data manipulation and wrangling using modern Python libraries like NumPy and Pandas to process and structure large-scale data for security investigations.
5. Develop advanced data visualization solutions using Matplotlib and Seaborn to effectively communicate complex security activities and findings to both technical and general audiences.

Course Content:

INTRODUCTION

(9 Hours)

Data Science: Benefits and uses - facets of data - Data Science Process: Overview - Defining research goals - Retrieving data - Data preparation - Exploratory Data analysis-build the model - presenting findings and building applications - Data Mining-Data Warehousing-Basic Statistical descriptions of Data

DESCRIBING DATA

(9 Hours)

Types of Data -Types of Variables -Describing Data with Tables and Graphs-Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores

DESCRIBING RELATIONSHIPS

(9 Hours)

Correlation -Scatter plots-correlation coefficient for quantitative data-computational formula for correlation coefficient - Regression -regression line -least squares regression line - Standard error of estimate - interpretation of r^2 -multiple regression equations - regression towards the mean

PYTHON LIBRARIES FOR DATA WRANGLING

(9 Hours)

Basics of Numpy arrays-aggregations-computations on arrays-comparisons, masks, boolean logic - fancy indexing - structured arrays - Data manipulation with Pandas - data indexing and selection - operating on data - missing data - Hierarchical indexing - combining datasets - aggregation and grouping - pivot tables

DATA VISUALIZATION

(9 Hours)

Importing Matplotlib-Line plots - Scatter plots - visualizing errors density and contour plots - Histograms - legends - colors - subplots - text and annotation - customization - three dimensional plotting-Geographic Data with Basemap - Visualization with Seaborn.

Total Hours: 45



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Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Recall the fundamental stages of the data science process and explain the theoretical principles of descriptive statistics, regression modeling, and data manipulation techniques using Python libraries.	L1, L2	-
CO2	Apply data science methodologies, statistical descriptions, and regression techniques using Python libraries (NumPy, Pandas, and Matplotlib) to process and visualize complex datasets for identifying system vulnerabilities.	L3	PO1
CO3	Analyze complex datasets by investigating statistical distributions, identifying correlations, and performing data wrangling to detect system anomalies in cyber security environments.	L4	PO2
CO4	Design a structured data science workflow incorporating statistical models and regression equations to develop predictive solutions for maintaining data integrity.	L5	PO3
CO5	Evaluate the effectiveness of regression models and data visualization strategies to validate conclusions on security breaches and ensure ethical compliance in data protection practices.	L5, L6	PO4 - PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. David Cielen, Amo D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit 1)
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlus, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

Reference Books:

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.



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Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	2	3	-	-	2	-	2	-	2	3	2
CO3	2	3	2	3	3	1	-	2	2	2	1	3	3	2
CO4	3	3	3	2	2	-	-	-	1	1	2	3	2	2
CO5	1	1	1	3	2	2	1	3	1	3	1	2	2	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC305	Subject Title	DESIGN AND ANALYSIS OF ALGORITHMS
Category	Professional Core	L-T-P-C	3-1-0-4
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand the fundamentals of algorithmic problem solving, analysis frameworks, and asymptotic notations to evaluate the efficiency of recursive and non-recursive algorithms.
2. Apply Brute Force and Divide and Conquer methodologies to solve computational problems like string matching and matrix multiplication, which are foundational to secure coding and cryptography.
3. Employ Dynamic Programming and Greedy techniques to develop optimal solutions for complex problems such as the knapsack problem and shortest path algorithms (Dijkstra's), relevant to network security and resource management.
4. Utilize Iterative Improvement and Backtracking strategies to solve constraint-based problems like the maximum-flow problem and Hamiltonian circuits, essential for analyzing network robustness and intrusion detection.
5. Analyze the limitations of algorithmic power by exploring P, NP, NP-Complete, and NP-Hard problems, and applying approximation algorithms to reach substantiated conclusions on computationally complex security challenges.

Course Content:

INTRODUCTION

(9+3 Hours)

Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types - Fundamentals of the Analysis of Algorithm Efficiency - Analysis Framework - Asymptotic Notations and their properties - Empirical analysis - Mathematical analysis of Recursive and Non-recursive algorithms - Visualization.

BRUTE FORCE AND DIVIDE AND CONQUER

(9 +3 Hours)

Brute Force - String Matching - Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology - Multiplication of Large Integers and Strassen's Matrix Multiplication- Closest-Pair and Convex - Hull Problems. Decrease and Conquer: Topological Sorting - Transform and Conquer: Presorting - Heaps and Heap Sort.

DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE

(10+3 Hours)

Dynamic programming - Principle of optimality - Coin changing problem - Warshall's and Floyd's algorithms - Optimal Binary Search Trees - Multi stage graph - Knapsack Problem and Memory functions. Greedy Technique - Dijkstra's algorithm - Huffman Trees and codes - 0/1 Knapsack problem.

ITERATIVE IMPROVEMENT

(7+3 Hours)

The Maximum-Flow Problem Graphs- Maximum Matching in Bipartite -The Stable marriage Problem.



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LIMITATIONS OF ALGORITHM POWER

(10+3 Hours)

Lower - Bound Arguments P, NP, NP- Complete and NP Hard Problems. Backtracking -N-Queen problem - Hamiltonian Circuit Problem - Subset Sum Problem. Branch and Bound - LIFO Search and FIFO search - Assignment problem - Knapsack Problem - Traveling Salesman Problem Approximation Algorithms for NP-Hard Problems -Traveling Salesman problem - Knapsack problem.

Total Hours: 60

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Identify important problem types and explain the fundamentals of algorithmic efficiency, asymptotic notations, and the mathematical analysis of recursive and non-recursive algorithms.	L1,L2	-
CO2	Apply various algorithmic design techniques, including Brute Force, Divide and Conquer, Dynamic Programming, and Greedy methods, to solve computational problems like string matching, knapsack, and shortest paths.	L3	PO1
CO3	Analyze the limitations of algorithmic power by investigating complexity classes (P, NP, NP-Hard) and performing empirical analysis on algorithms to reach substantiated conclusions on their performance.	L4	PO2
CO4	Design efficient algorithmic solutions for complex problems using advanced strategies like Backtracking, Branch and Bound, and Iterative Improvement to develop robust architectures for data integrity.	L5	PO3
CO5	Evaluate the principle of optimality and the effectiveness of approximation algorithms for NP-Hard problems to validate the most efficient solution for complex security challenges.	L5-L6	PO4,PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.



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Text Books:

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2012.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/C++, Second Edition, Universities Press, 2019.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2012.
3. S. Sridhar, Design and Analysis of Algorithms, Oxford university press, 2014.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, Reprint 2006.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	1	-	-	-	-	-	-	3	2	-
CO3	2	3	2	3	-	-	-	-	-	-	-	2	3	1
CO4	3	3	3	2	-	-	-	-	-	-	-	3	2	1
CO5	2	3	2	3	-	-	-	-	-	-	-	2	2	2

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YMC306	Subject Title	CONSTITUTION OF INDIA
Category	Mandatory Course	L-T-P-C	1-0-0-0
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

1. Historical Context: To provide a comprehensive understanding of the evolution of the Indian Constitution from the pre-independence era (1909) to its final adoption by the Constituent Assembly.
2. Rights and Duties: To sensitize students to their fundamental rights and duties as citizens, while highlighting the state's responsibilities through Directive Principles.
3. Governance Structure: To familiarize students with the functions, powers, and interrelationships between the Union Executive (President), the Legislature (Parliament), and the Judiciary (Supreme Court).
4. Federal Framework: To explain the administrative and legislative machinery at the State level, focusing on the roles of the Governor, State Legislature, and the High Court.
5. Social Inclusion: To instill an appreciation for the constitutional values of Secularism and Social Justice, and to understand the legal safeguards provided for the protection of minorities.

Course Content:

HISTORICAL EVOLUTION

(3)

1. Constitutional Development Since 1909 to 1947
2. Making of the Constitution.
3. Constituent Assembly

INDIVIDUAL RIGHTS AND OBLIGATIONS

(3)

1. Fundamental Rights
2. Fundamental Duties
3. Directive Principles of State Policy

CENTRAL GOVERNANCE STRUCTURES

(3)

1. President
2. Parliament
3. Supreme Court

STATE-LEVEL ADMINISTRATION

(3)

1. Governor
2. State Legislature
3. High Court



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SOCIAL AND ETHICAL FRAMEWORKS

(3)

1. Secularism
2. Social Justice
3. Minority Safeguards

TOTAL: 15

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Understand the constitutional framework of State governments, including the role of the Governor, the working of the State Legislature, and the jurisdiction of High Courts.	L1,L2	-
CO2	Examine the relationship between Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties, and assess their significance in protecting citizen interests.	L3	PO1
CO3	Appraise the powers and functions of the President, the legislative process of the Parliament, and the judicial review mechanism of the Supreme Court.	L4	PO2
CO4	Analyze the constitutional development in India from 1909 to 1947 and explain the historical processes and the role of the Constituent Assembly in framing the Constitution	L5	PO3
CO5	Evaluate the concepts of Secularism and Social Justice within the Indian context and justify the constitutional safeguards provided for minority groups.	L5-L6	PO4,PO11

REFERENCES:

1. Basu.D.D, "Introduction to Indian Constitution", Prentice Hal, NewDelhi.
2. Kapur.A.C , "Indian Government and Political System", S.Chand and Company Ltd.,NewDelhi.
3. JohariJ.C, "Indian Politics", Vishal Publications Ltd, NewDelhi
4. AgarwalR.C, "Indian Political System", S.Chand & Co. ,NewDelhi

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Subject Code	25YPC307	Subject Title	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION LABORATORY
Category	Professional Core	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Master Digital Logic Synthesis: Design and implement optimized combinational and sequential circuits (adders, multiplexers, and counters) to perform specific arithmetic and logical tasks.
2. Analyze Data Path Components: Construct and validate essential CPU components, including the Arithmetic Logic Unit (ALU) and Universal Shift Registers, understanding how data flows between registers.
3. Bridge Logic and Architecture: Translate abstract Register Transfer Language (RTL) descriptions into physical or simulated hardware designs.
4. Design Control Mechanisms: Develop functional control units using both hardwired and microprogramming techniques to coordinate the operation of a data path.
5. Integrate a Functional Processor: Synthesize the data path and control unit to implement a simple instruction set computer, gaining a holistic view of processor design and execution cycles.
6. Utilize Modern EDA Tools: Apply simulation software to study and verify computer architecture concepts before physical implementation.

Course Content:

1. Design and implementation of combinational circuits using gates for arbitrary functions.
2. Implementation of 4-bit binary adder/subtractor circuits.
3. Implementation of code converters.
4. Implementation of BCD adder, encoder and decoder circuits
5. Implementation of functions using Multiplexers.
6. Implementation of the synchronous counters
7. Implementation of a Universal Shift register.
8. Simulator based study of Computer Architecture.
9. Design of an 8-bit Arithmetic Logic Unit.
10. Design the data path of a computer from its register transfer language description.



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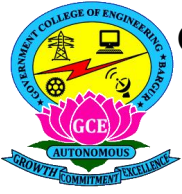


11. Design the control unit of a computer using either hardwiring or micro programming based on its register transfer language description.
12. Implement a simple instruction set computer with a control unit and a data path.
13. Synthesis/Design of simple data paths and controllers, concept of Processor design.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Understand: Illustrate the fundamental principles of digital logic including combinational circuits, sequential elements and the functional blocks of computer architecture.	L1, L2	-
CO2	Apply: Build functional arithmetic units, code converters and data routing circuits using standard logic gates MSI devices like multiplexers	L3	PO2
CO3	Analyze: Examine the relationship between Register Transfer Language (RTL) descriptions and the physical hardware requirements for data paths and control units.	L4	PO1, PO4
CO4	Design: Construct a complete 8-bit ALU and a simple instruction set computer by integrating a synthesized data path with a hardwired or micro programmed control unit.	L5	PO3, PO10
CO5	Evaluate: Assess the performance and correctness of digital systems and processor designs through simulator-based studies and hardware verification	L5-L6	PO4-PO11



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Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	1	-	-	-	2	-	-	1	3	1
CO3	2	3	2	2	2	-	-	-	-	-	-	1	3	2
CO4	3	3	3	2	2	-	-	-	2	1	-	2	3	3
CO5	2	2	2	3	3	2	1	3	2	2	1	2	2	2

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC308	Subject Title	DATA SCIENCE LABORATORY
Category	Professional Core	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Install and explore essential Python libraries for data science, including NumPy, SciPy, Jupyter, Statsmodels, and Pandas.
2. Master data manipulation techniques using NumPy arrays and Pandas data frames to handle structured information.
3. Perform descriptive analytics and data exploration on standard datasets (like Iris) sourced from text, Excel, and web files.
4. Conduct statistical analysis including univariate, bivariate, and multiple regression modeling on healthcare-related datasets like UCI and Pima Indians Diabetes.
5. Apply advanced visualization techniques to interpret data through normal curves, density plots, 3D plotting, and geographic data mapping.

List Of Experiments:

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodel and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
 - a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
 - b. Bivariate analysis: Linear and logistic regression modeling.
 - c. Multiple Regression analysis.
 - d. Also compare the results of the above analysis for the two data sets.



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6. Apply and explore various plotting functions on UCI data sets.

- Normal curves
- Density and contour plots
- Correlation and scatter plots
- Histograms
- Three dimensional plotting

7. Visualizing Geographic Data with Basemap

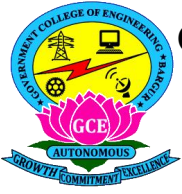
Total Hours: 45

Tools: Python, Numpy, Scipy, Matplotlib, Pandas, statmodels, seaborn, plotly, bokeh

Note: Example data sets like: UCI, Iris, Pima Indians Diabetes etc.

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Utilize modern tools and Python libraries to set up a data science environment and perform initial data exploration.	L1, L2	PO5
CO2	Analyze complex datasets by applying mathematical principles and descriptive statistics to identify patterns and vulnerabilities.	L3	PO2
CO3	Develop regression models (Linear, Logistic, and Multiple) to predict outcomes and substantiate conclusions from security-related data.	L4	PO1, PO4
CO4	Design visual solutions for complex data interpretation using histograms, scatter plots, and 3D visualization to communicate findings.	L5	PO3, PO10
CO5	Evaluate and compare results from multiple datasets ethically, ensuring data integrity and professional standards in "White Hat" analysis.	L5-L6	PO4-PO11



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Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	2	3	-	2	2	-	-	-	-	-	-	2	3	-
CO3	3	3	2	3	2	-	-	-	-	-	-	3	2	1
CO4	1	2	3	-	3	-	-	-	-	3	-	2	3	-
CO5	-	-	-	2	-	2	1	3	2	2	1	2	2	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



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Subject Code	25YPC309	Subject Title	DATA STRUCTURES AND ALGORITHMS LABORATORY
Category	Professional Core	L-T-P-C	0-0-4-2
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this laboratory course is to enable students to:

1. Develop Proficiency in Linear Structures: Implement and demonstrate the functionality of List, Stack, and Queue Abstract Data Types (ADTs) using both array-based and linked list approaches.
2. Apply Data Structures to Real-World Problems: Utilize linear data structures and their applications to solve specific computational logic problems.
3. Master Mapping and Search Techniques: Build and manage Hash tables to understand efficient data retrieval and collision resolution.
4. Implement Hierarchical and Ordered Structures: Construct and execute traversal algorithms for Trees, Binary Search Trees, and Heaps to manage hierarchical data effectively.
5. Solve Complex Network Problems: Represent graphs and implement fundamental algorithms including Breadth-First Search (BFS), Depth-First Search (DFS), and Shortest Path algorithms like Dijkstra's.
6. Optimize Graph Solutions: Apply greedy and dynamic programming strategies to solve optimization problems, such as finding Minimum Spanning Trees (Kruskal's and Prim's) and solving the Travelling Salesperson Problem.

Practical Exercises:

1. Implement List ADT using Python arrays.
2. Linked list implementations of List
3. Implementation of Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Hash tables
6. Tree representation and traversal algorithms
7. Implementation of Binary Search Trees
8. Implementation of Heaps
9. Graph representation and Traversal algorithms
10. Implementation of single source shortest path algorithm
11. Implementation of Dijkstra's algorithm



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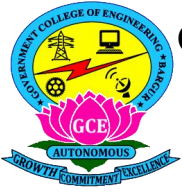


12. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm and Prim's algorithm
13. Implement Travelling Sales Person problem using Dynamic Programming.
14. Implementation of minimum spanning tree algorithms

Total Hours: 60

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the fundamental concepts of Abstract Data Types (ADTs), including List, Stack, and Queue, and their memory representations using both arrays and linked lists.	L1,L2	
CO2	Implement core data structures and algorithms, including Hash tables, Binary Search Trees, and Heaps, using Python to solve specific organizational and retrieval problems.	L3	
CO3	Examine the performance of various graph traversal algorithms and shortest path methods, such as Dijkstra's and single-source shortest path, within directed and undirected networks.	L4	
CO4	Construct comprehensive algorithmic solutions for complex graph problems, such as finding the Minimum Cost Spanning Tree and managing priority queues, to optimize system performance.	L5	
CO5	Assess the efficiency of optimization algorithms, including Kruskal's, Prim's, and Dynamic Programming approaches for the Travelling Salesperson problem, to determine the most cost-effective solution for connected graphs.	L5-L6	



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Course Articulation matrix:

CO	Program Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	2	3	2	1
CO2	3	3	2	2	3	-	-	-	2	1	-	2	3	3	2
CO3	3	3	3	2	3	-	-	-	2	1	-	2	3	3	2
CO4	3	3	3	3	3	-	-	-	3	2	1	3	3	3	3
CO5	3	3	3	3	3	-	-	-	2	1	-	2	3	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

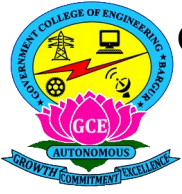
Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date : 12/03/2026.



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SEMESTER - IV



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC401	Subject Title	THEORY OF COMPUTATION
Category	Professional Core	L-T-P-C	3-1-0-4
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand the fundamental hierarchy of formal languages and the corresponding automata models, including DFA, NFA, and Epsilon transitions, to build a theoretical basis for pattern matching and intrusion detection.
2. Apply regular expressions and finite automata equivalence to design efficient string-searching algorithms and recognize regular languages essential for secure coding practices.
3. Develop and simplify Context-Free Grammars (CFG) using normal forms (CNF, GNF) and identify ambiguity in languages to ensure precise and secure data parsing.
4. Analyze the capabilities of Pushdown Automata (PDA) and their equivalence with CFGs to understand the stack-based processing required for language recognition and secure protocol verification.
5. Evaluate the power of Turing Machines as universal computing devices and explore the boundaries of decidability, including the Halting Problem, to understand the computational limits of security algorithms.

Course Content:

INTRODUCTION TO FORMAL LANGUAGES AND FINITE AUTOMATA

(9 Hours)

Introduction to Formal Languages, Grammars and Automata; Types of Grammars - Chomsky's hierarchy of languages, Regular Languages and Regular Expressions, Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA), Non-deterministic Finite Automata with Epsilon transitions, Conversion of NFA into DFA, DFA Minimization.

REGULAR LANGUAGES, CONTEXT FREE GRAMMARS AND NORMAL FORMS

(9 Hours)

Kleene's theorem - Equivalence of Regular Expressions and Finite Automata, Myhill-Nerode Theorem, Moore and Mealy machines and its equivalence, Closure properties of Regular Languages, Pumping Lemma for regular languages.

Context-Free Grammar (CFG) and Languages, Derivations and Parse trees, Ambiguity in grammars and languages, Normal forms for CFG, Simplification of CFG, Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

CONTEXT FREE LANGUAGES AND PUSHDOWN AUTOMATA

(9 Hours)

Closure properties of Context Free Languages, Pumping lemma for CFL, Ogden's Lemma, Push Down Automata (PDA), Languages of pushdown automata, Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG, Deterministic Pushdown Automata.



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TURING MACHINES

(9 Hours)

Turing Machines, Language of a Turing Machine, Turing Machine as a Computing Device, Modifications of Turing Machines, Two-way Infinite Tape, Equivalence of One Way Infinite Tape and Two-way Infinite Tape Turing Machines, Multi Tape Turing Machines, Nondeterministic Turing machine, Universal Turing machines.

RECURSIVE, RECURSIVELY ENUMERABLE PROBLEMS AND UNDECIDABILITY (9 Hours)

Recursive and recursively enumerable languages, Properties, Reducibility Theory, Rice Theorem for Recursive and Recursively Enumerable Languages, Halting Problem and undecidability, Post's Correspondence Problems (PCP), Modified Post Correspondence Problem.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the hierarchy of formal languages and the fundamental principles of finite automata, context-free grammars, pushdown automata, and Turing machines.	L1,L2	-
CO2	Apply mathematical transformations, such as NFA to DFA conversion, DFA minimization, and the simplification of CFGs into normal forms (CNF/GNF), to solve computational problems.	L3	PO1
CO3	Analyze the properties of regular and context-free languages using Pumping Lemmas and Myhill-Nerode theorem to determine language closure and membership.	L4	PO2
CO4	Design finite automata, pushdown automata, and universal Turing machines to represent complex languages and provide valid conclusions on the limits of algorithmic computation.	L5	PO3
CO5	Evaluate the equivalence between different automata models (NFA/DFA, PDA/CFG) and the decidability of languages, including the Halting problem and Post's Correspondence Problem.	L5-L6	PO4, PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. John C Martin. "Introduction to Languages and the Theory of Computation", 4th Edition, Tata McGraw Hill, 2015.



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Reference Books:

1. Harry R Lewis and Christos H Papadimitriou, "**Elements of the Theory of Computation**", 2nd Edition, Prentice Hall of India, 2015.
2. Peter Linz, "**An Introduction to Formal Language and Automata**", 6th Edition, Jones & Bartlett, 2016.
3. Michael Sipser, "**Introduction to Theory of Computation**", Third Edition, Cengage learning, 2013.
4. Adam Brooks Webber, "**Formal languages: a practical introduction**", Jim Leisy, 2008.
5. Hopcroft JE, Motwani R. & Ullman J.D., "**Introduction to Automata Theory, Languages and Computations**", 3rd Edition, Pearson Education, 2008.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	1	-	-	-	-	-	-	-			-
CO3	2	3	1	3	-	-	-	-	-	-	-			
CO4	3	3	3	2	-	-	-	-	-	-	-			
CO5	1	2	-	3	-	-	-	-	-	-	-			

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC402	Subject Title	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand the evolution and fundamentals of AI, including the role of intelligent agents and both uninformed and informed search strategies to solve complex computational problems.
2. Apply logical reasoning and knowledge representation through propositional and first-order logic to develop inference-based security systems.
3. Analyze the philosophy, ethics, and safety of AI to ensure that automated security components comply with digital privacy and data protection laws.
4. Implement machine learning paradigms, including supervised learning (SVMs, Decision Trees) and unsupervised learning (Clustering), to reach substantiated conclusions regarding system vulnerabilities.
5. Design and tune neural network architectures—incorporating deep learning, backpropagation, and ensemble methods—to predict and mitigate sophisticated cyber-attacks

Course Content:

INTRODUCTION TO AI

(9 Hours)

Artificial Intelligence: Introduction - Past, Present and Future - Intelligent Agents - Benefits/Risks of AI - Applications of AI-Problem Solving agents - Search Algorithms - Uninformed Search Strategies: Breadth-first search - Depth-first search-Depth-limited search-Iterative deepening search.

PROBLEM-SOLVING

(9 Hours)

Informed search algorithms: Heuristic search strategies - heuristic functions. Best-first search-Greedy best-first search - A* search - Depth First Branch and Bound - Local search and optimization problems - local search in continuous space - search with non-deterministic actions - search in partially observable environments - online search agents and unknown environments.

LOGICAL REASONING AND ETHICS

(9 Hours)

Knowledge-based agents - prepositional logic - prepositional theorem proving - prepositional model checking - agents based on prepositional logic. First-order logic – syntax and semantics - knowledge representation and engineering - inferences in first-order logic - forward chaining-backward chaining -resolution. Philosophy, Ethics and Safety of AI. The Limits of AI-The Ethics of AI - AI Components -AI Architectures, The Future of AI.



INTRODUCTION TO MACHINE LEARNING

(9 Hours)

Introduction: Basic Definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation - Linear regression, Decision trees and overfitting - Instance based learning, Feature reduction, Collaborative filtering-based recommendation - Probability and Bayes learning- Logistic Regression- Support Vector Machine- Kernel function and Kernel SVM.

NEURAL NETWORK AND CLUSTERING

(9 Hours)

Neural Network: Perceptron, multilayer network, backpropagation-Introduction to deep neural network – ReLU, Hyperparameter tuning, Batch normalization, Dropout-Computational learning theory- PAC learning model- Sample complexity-VC Dimension, Ensemble learning Clustering: K-means- adaptive hierarchical clustering-Gaussian mixture models

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the fundamental notions of algorithmic efficiency, asymptotic notations, search strategies (uninformed/informed), and machine learning paradigms to build a theoretical foundation for solving security problems.	L1,L2	-
CO2	Apply algorithmic design techniques (Divide and Conquer, Dynamic Programming, Greedy) and machine learning models (Linear/Logistic Regression, SVMs) to develop computational solutions for string matching and data classification.	L3	PO1
CO3	Analyze the limitations of algorithmic power (P, NP-Hard), the performance of heuristic functions, and neural network complexities to detect anomalies and vulnerabilities in cyber environments.	L4	PO2
CO4	Design efficient architectures using backtracking, iterative improvement, and ensemble learning to create robust intrusion detection systems and mitigate complex cyber-attacks.	L5	PO3
CO5	Evaluate the principle of optimality, approximation algorithms, and the ethics/safety of AI components to validate the reliability and compliance of security-based decision-making systems.	L5-L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.



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Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", Fourth Edition, Pearson Education, 2021.
2. Tom Mitchell, "Machine Learning ", First Edition, McGraw Hill Education, July 2017.
3. Ethem Alpaydin, "Introduction to Machine Learning", Fourth Edition, The MIT Press, 2020

Reference Books:

1. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008.
2. Elain Rich and Kevin Knight-"Artificial Intelligence", Third Edition, Tata Mcgraw Hill Publishing Company, New Delhi, 2014.
3. David L.Poole and Alan K.Macworth, "Artificial Intelligence: Foundations of Computational Agents", Second Edition,Cambridge University Press, 2010.
4. Stephen Marsland, "Machine Learning-An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
5. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	3	-	-	-	-	-	-			-
CO3	2	3	2	3	2	1	-	-	-	-	-			
CO4	3	3	3	2	3	-	-	-	-	-	-			
CO5	1	2	1	3	-	2	-	3	-	2	-			

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC403	Subject Title	COMPUTER NETWORKS
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand Fundamental Architectures: Analyze the concepts of data communication and the hierarchical structure of protocol layering, specifically the OSI Model and TCP/IP Protocol suite.
2. Master Application Layer Protocols: Evaluate the mechanisms of key application protocols such as HTTP, FTP, SMTP, DNS, and SNMP to understand how network services are delivered to end-users.
3. Analyze Transport Layer Mechanisms: Demonstrate an understanding of connection management, flow control, and congestion control strategies within TCP, UDP, and SCTP to ensure reliable data transfer.
4. Implement Network Layer Concepts: Gain proficiency in IPv4 and IPv6 addressing, subnetting, and the role of auxiliary protocols like ARP, ICMP, and DHCP in packet switching environments.
5. Evaluate Routing Protocols: Compare and contrast unicast and multicast routing algorithms, including RIP (Distance Vector), OSPF (Link State), and BGP (Path-vector), to determine optimal paths in complex networks.
6. Examine Data Link and Physical Layer Operations: Understand the technicalities of framing, error control, and media access control (CSMA/CD), alongside the physical characteristics of transmission media and switching.

Course Content:

INTRODUCTION AND APPLICATION LAYER

(9 Hours)

Data Communication - Networks - Network Types - Protocol Layering - TCP/IP Protocol suite -OSI Model - Introduction to Sockets - Application Layer protocols: HTTP - FTP - Email protocols (SMTP -POP3 - IMAP - MIME) - DNS - SNMP.

TRANSPORT LAYER

(9 Hours)

Introduction - Transport-Layer Protocols: UDP - TCP: Connection Management - Flow control -Congestion Control - Congestion avoidance (DECbit, RED) - SCTP - Quality of Service.



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NETWORK LAYER

(9 Hours)

Switching: Packet Switching - Internet protocol - IPV4 - IP Addressing - Subnetting - IPV6, ARP, RARP, ICMP, DHCP

ROUTING

(9 Hours)

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing OSPF - Path-vector routing - BGP - Multicast Routing: DVMRP - PIM.

DATA LINK AND PHYSICAL LAYERS

(9 Hours)

Data Link Layer - Framing - Flow control - Error control - Data-Link Layer Protocols - HDLC -PPP Media Access Control - Ethernet Basics - CSMA/CD- Virtual LAN - Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance - Transmission media- Switching - Circuit Switching.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the fundamental principles of data communication, the layered architecture of OSI and TCP/IP models, and the functions of various protocols across the physical, data link, network, transport, and application layers.	L1,L2	-
CO2	Apply addressing schemes (including IPv4 subnetting and IPv6) and error control mechanisms to ensure efficient data representation and reliable delivery across heterogeneous network types.	L3	PO1
CO3	Analyze the performance and behavior of Transport Layer protocols (TCP/UDP) and Routing protocols (Distance Vector, Link State) in managing flow, congestion, and path selection within a network.	L4	PO2
CO4	Design basic network configurations and application-layer service interactions using Sockets and standard protocols like HTTP, FTP, and DNS to meet specific organizational communication requirements.	L5	PO3
CO5	Evaluate the effectiveness of various Media Access Control techniques (CSMA/CD), switching methods, and Quality of Service (QoS) parameters to optimize network throughput and minimize latency.	L5-L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Text Books:

1. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022

Reference Books:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
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CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	1	3	2	-
CO3	3	3	2	2	-	-	-	-	-	-	1	3	2	-
CO4	3	2	3	2	2	-	-	-	-	-	1	3	3	1
CO5	1	1	1	1	2	2	2	2	2	2	2	2	2	1

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate

Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC404	Subject Title	OPERATING SYSTEMS AND SECURITY
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The main objectives of this course are to:

1. OS Fundamentals: Provide a comprehensive understanding of computer system organization, operating system structures, and the fundamental services provided by the kernel.
2. Resource Management: Enable students to apply principles of process management, including CPU scheduling, inter-process communication, and multithreading models.
3. System Stability: Teach methods for handling deadlocks through prevention, avoidance, and detection to ensure continuous system operation.
4. Memory and Storage: Explain memory management techniques like paging and virtual memory, alongside file system structures and free space management.
5. Security Modeling: Introduce formal security goals and trust models, including secrecy and integrity models such as Bell-LaPadula and Biba.
6. Access Control: Detail the implementation of authentication and authorization mechanisms across various platforms, including Unix, Windows, and Android.
7. Defensive Design: Equip students with the knowledge to identify and bypass security threats like rootkits while understanding the role of the Reference Monitor.

Course Content:

OPERATING SYSTEM OVERVIEW

(9 Hours)

Computer-System Organization- Architecture- Operating-System Operations- Resource Management - Security and Protection - Distributed Systems - Kernel Data Structures - Operating-System Services - System Calls - System Services - Why Applications Are Operating-System Specific - Operating-System Design and Implementation - Operating System Structure -Building and Booting an Operating System.

PROCESS MANAGEMENT

(9 Hours)

Process Concept-Process Scheduling Operation on Processes, Inter-process Communication - Threads - Overview - Multithreading models-Threading issues: CPU Scheduling - Scheduling criteria, Scheduling algorithms; Process Synchronization-critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock- System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection Recovery.

MEMORY MANAGEMENT AND FILE SYSTEMS

(9 Hours)

Main Memory - Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation - Virtual Memory - Demand Paging, Page Replacement, Allocation, Thrashing, Allocating Kernel Memory. Mass Storage system HDD Scheduling - File concept, Access methods, Directory



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Structure, Sharing and Protection: File System Structure, Directory implementation, Allocation Methods, Free Space Management

SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS

(9 Hours)

Security Goals - Trust and Threat Model - Access Control Fundamentals - Protection System Reference Monitor - Secure Operating System Definition- Assessment Criteria - Information Flow Information Flow Secrecy Models- Denning's Lattice Model - Bell LaPadula Model -Information Flow Integrity Models - Biba Integrity Model -Low-Water Mark Integrity - Clark-Wilson Integrity.

SECURITY IN OPERATING SYSTEMS

(9 Hours)

User Authentication: Biometric Authentication, Passwords, Pattern Locks, Trends in User Authentication, Authentication Through the Net – Authorisation, Protection & Rights: Access Control Matrices, Access Control Lists, Directories, Capabilities – Access Control in File Systems: Unix-style File Systems, setuid and setgid, Windows NT ACLs – Access Control for Other System Components : Access Control for Other System Components : Access control in memory, Access control for Hardware Units, Access control for the CPU, Access control in Android, Bypassing Access Control: Rootkits,– Encryption in the Operating System-Job Scheduling.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the fundamental concepts of operating system organization, resource management, and the principles of secure system design including reference monitors and access control fundamentals.	L1,L2	-
CO2	Apply various process scheduling algorithms, synchronization techniques (like semaphores and monitors), and memory management schemes such as paging and segmentation to optimize system performance.	L3	PO1
CO3	Analyze deadlock scenarios and information flow models, including the Bell-LaPadula and Biba integrity models, to identify potential security vulnerabilities within an operating system.	L4	PO2
CO4	Design integrated security solutions for operating systems that incorporate encryption, secure boot processes, and robust file system protection to mitigate threats like rootkits.	L5	PO3
CO5	Evaluate the effectiveness of different authentication methods (biometrics, passwords) and access control mechanisms (ACLs, Capabilities, Unix/Windows styles) in protecting system components.	L5-L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.



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Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Silberschatz, Peter Baer Galvin and Greg Gagne, "Op John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.
3. Robin Sharp, Introduction to Cybersecurity: A Multidisciplinary Challenge, Springer, 2024

Reference Books:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems - Internals and Design Principles", 9th Edition, Pearson, 2017
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology - Cengage Learning, New Delhi, 2008.

Course Articulation matrix:

CO	Program Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	3	2	-
CO3	2	3	3	3	2	-	-	-	-	-	-	2	2	3	2
CO4	3	3	3	2	3	2	1	2	1	1	1	3	3	3	3
CO5	1	1	1	1	3	3	3	2	3	3	3	2	2	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC405	Subject Title	DATABASE MANAGEMENT SYSTEMS AND SECURITY
Category	Professional Core	L-T-P-C	3-0-0-3
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Understand the fundamental concepts of database management systems, including data models, schemas, and the role of the Database Administrator (DBA) in maintaining secure environments.
2. Apply relational algebra and SQL to design, create, and manage complex databases while ensuring data integrity and consistency through normalization techniques.
3. Analyze transaction management and concurrency control mechanisms to identify and mitigate potential vulnerabilities related to unauthorized data access or race conditions.
4. Evaluate storage structures and indexing techniques to optimize query performance and reach substantiated conclusions on the efficiency of data retrieval in security-sensitive applications.
5. Design robust database architectures incorporating backup, recovery, and access control models (like RBAC) to meet specified needs for confidential

Course Content:

RELATIONAL DATABASES

(9 Hours)

Data Models - Relational Data Models - Relational Algebra - Structured Query Language - Entity - Relationship Model - Mapping ER Models to Relations - Distributed Databases - Data Fragmentation – Replication.

DATABASE DESIGN

(9 Hours)

ER Diagrams - Functional Dependencies - Non-Loss Decomposition Functional Dependencies -First Normal Form - Second Normal Form - Third Normal Form - Dependency Preservation -Boyce/Codd Normal Form - Multi-Valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.

TRANSACTION MANAGEMENT

(9 Hours)

Transaction Concepts - ACID Properties - Serializability - Transaction Isolation Levels - Concurrency Control - Need for Concurrency - Lock-Based Protocols - Deadlock Handling - Recovery System – Failure Classification - Recovery Algorithm.

DATABASE SECURITY

(9 Hours)

Need for database security - SQL Injection Attacks - The Injection Technique - SQLi Attack - Avenues and Types.



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ACCESS CONTROL AND ENCRYPTION

(9 Hours)

Database Access Control - SQL based access definition - Cascading Authorizations - Role - based access control - Inference - Database encryption.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Explain the fundamental concepts of database architectures, data models, and the role of normalization in ensuring data integrity and reducing redundancy.	L1,L2	-
CO2	Apply Structured Query Language (SQL) and relational algebra to perform secure data definition, manipulation, and retrieval operations across complex relational databases.	L3	PO1
CO3	Analyze transaction processing, concurrency control mechanisms, and recovery techniques to identify potential vulnerabilities such as race conditions or unauthorized data access.	L4	PO2
CO4	Design robust database schemas and ER models that incorporate advanced security features, including firewalls and access controls, to meet specific organizational needs for data privacy.	L5	PO3
CO5	Evaluate indexing strategies, query optimization techniques, and database security models (like RBAC) to validate the efficiency and confidentiality of data storage solutions	L5-L6	PO4-PO11

Note:

CO1 - CO4: Internal Assessment Tests (IATs), End semester Examination (ESE).

CO5: Only for assignment and seminar. NOT for IATs & ESE.

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts". Seventh Edition, Tata McGraw Hill, 2021.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
3. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson, 2019.



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Reference Books:

1. C.J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006, UGH KNOWLEDGE
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.
3. Narain Gehani and Melliya Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	1	3	-	-	-	-	-	-	2	3	-
CO3	2	3	2	3	2	1	-	-	-	-	-	2	3	1
CO4	3	3	3	2	3	-	-	-	-	-	-	3	2	2
CO5	1	2	1	3	-	2	1	3	-	2	-	1	3	2

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K. Kumar

Associate Professor

Name & Designation

BOS Approval

Date: 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of Chemistry



Course code	25ZBS406	Course Title	Environmental Sciences and Sustainability
Category	Basic Science	L-P-T-C	2-0-0-2
Regulation	R-2025	Semester	04
Prerequisites	Nil		
Course Objectives:			
1. To define key terms, concepts, and principles of environmental science, ecology, biodiversity, pollution, environmental laws and sustainability. 2. To understand the inter relationship between environment and living organisms Environmental literacy: 1) Where do the things I consume come from? 2) What do I know about the place where I live? 3) What is my responsibility as a human being? 3. To equip students to apply environmental principles and scientific methods to solve real-world environmental problems. 4. To enable the students to analyse complex environmental issues, their root causes and connections between environmental, social, and economic systems. 5. To evaluate the waste management strategies, energy efficiency, carbon footprints and standards regarding environmental policies and sustainable practices.			
ENVIRONMENT AND BIODIVERSITY			6 hours
Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India –conservation of biodiversity: In-situ and ex-situ.			
ENVIRONMENTAL POLLUTION			6 hours
Pollution: Definition - Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Hazardous waste: definition – types - Solid waste - Solid waste management - waste disposal methods – E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.			
RENEWABLE SOURCES OF ENERGY			6 hours
Renewable and non-renewable energy resources - Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.			
SUSTAINABILITY AND MANAGEMENT			6 hours
Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.			
SUSTAINABILITY PRACTICES			6 hours
Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socioeconomical and technological change.			
TOTAL: 30 PERIODS			

Upon successful completion of this course, student will be able to,		
CO	Course Outcome	Bloom's Level
CO1	Environmental problems cannot be solved by mere laws. Public awareness is an important aspect which defines the importance of environment conservation and its benefits.	L1
CO2	The key goals of environmental literacy will help the students, to make a leap from 1) YES 'I KNOW' about MY Environment. 2) 'I will CARE' for MY Environment. 3) 'I'll RESPECT and CONSERVE MY Environment.	L2
CO3	Apply environmental laws and regulations to specific case studies. Implement new technologies in solving environmental problems can move towards health, longevity, peace and prosperity.	L3
CO4	Analysing the values and attitudes towards understanding complex environmental-economic-social challenges, and participating actively in solving current environmental problems by adopting sustainability as a practice in life, society and industry.	L4
CO5	Evaluate and design an eco-friendly product or a green technology solution for improving environmental quality and develop a better understanding of human relationships, perceptions and policies towards the environment.	L5

Text Books:

1. G. Tyler Miller & Scott Spoolman, "Environmental Science" 16th edition, Cengage Learning India Pvt. Ltd., 2023.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.

Reference Books:

1. R K Trivedy, "Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards" Vol.I, B.S. Publications, 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopaedia", 2nd Edition, Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice Hall of India Pvt. Ltd., New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.
5. Bharucha Erach, "The Biodiversity of India", Mapin Publishing Pvt. Ltd., Ahmedabad India.

COURSE ARTICULATION MATRIX											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	1	2	1	1	2		1	1		1
CO2	1	1	1	1	1	2		1	1		2
CO3	1		1	1	1	2		1			2
CO4	1	1	3	1	2	2		1	1		2
CO5	1	1	1	1	2	2		1	1		2

Correlation Levels: 3 – Strong, 2 – Medium, 1 – Low and (-) No correlation

Course Designed by

1. Dr.G.SARASWATHY,
ASP & Head/Chemistry.
2. Dr.S.ELUMALAI, AP/Chemistry.



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Department of CSE - CYBER SECURITY



Subject Code	25YPC407	Subject Title	COMPUTER NETWORKS LABORATORY
Category	Professional Core	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Demonstrate proficiency in using network administration commands and protocol analysers to troubleshoot and monitor network traffic.
2. Develop network applications using TCP and UDP socket programming to understand client-server communication models.
3. Implement data link and network layer protocols through simulation to grasp error detection and address resolution mechanisms.
4. Analyze the performance of transport layer protocols and congestion control algorithms using modern network simulation tools.
5. Evaluate the efficiency of various routing strategies, such as Distance Vector and Link State algorithms, in a simulated environment.

Practical Exercises:

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Simulation of LAN using Packet Tracer
4. Simulation of Cisco Router and Switch basics using Packet Tracer
5. Applications using TCP sockets like: a) Echo client and echo server b) Chat
6. Simulation of DNS using UDP sockets.
7. Use a tool like Wireshark to capture packets and examine the packets
8. Write a code simulating ARP /RARP protocols.
9. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
10. Study of TCP/UDP performance using Simulation tool.
11. Simulation of Distance Vector/ Link State Routing algorithm.
12. Simulation of an error correction code (like CRC)

Total Hours: 45



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Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Describe the operation of network diagnostic tools and the structure of captured PDUs.	L1,L2	-
CO2	Construct socket-based applications for web clients, chat systems, and DNS resolution.	L3	PO1
CO3	Examine network performance metrics and congestion behaviors using simulation software.	L4	PO2
CO4	Critically assess the path-finding efficiency of different routing algorithms.	L5	PO3
CO5	Create simulated environments to model error correction (CRC) and address mapping (ARP/RARP).	L5-L6	PO4

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	2	1	-	3	3	2
CO3	3	3	2	3	3	-	-	-	-	-	-	3	2	3
CO4	3	3	3	2	3	-	-	-	-		-	3	3	2
CO5	3	3	3	2	2	-	-	-	2	1	-	3	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date : 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC408	Subject Title	OPERATING SYSTEMS AND SECURITY LABORATORY in KALI LINUX
Category	Professional Core	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	III
Prerequisites			

Course Objectives:

The objective of this course is to enable students to:

1. Master System Architecture: Gain proficiency in Linux environments, including file system hierarchies, process management, and advanced permission structures (SUID/SGID/ACLs).
2. Develop Low-Level Programming Skills: Implement core OS functions using C and UNIX system calls to manage processes, memory allocation, and concurrency through semaphores and shared memory.
3. Analyze Resource Management: Evaluate the efficiency of different CPU scheduling, memory fit, and page replacement algorithms through programmatic simulation.
4. Apply Security Frameworks: Understand formal security models (Bell-LaPadula/Biba) and practical system hardening techniques like ASLR.
5. Execute Vulnerability Assessments: Build a controlled lab environment (Kali/Metasploitable) to perform reconnaissance, network scanning, and information gathering using industry-standard tools.

Practical Exercises:

1. Basics of UNIX commands, Understand and practice Linux permissions, special permissions and authentication (various options of chmod, setuid, setgid)
2. Write programs using the following system calls of UNIX operating system
 - a. fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to implement the various CPU Scheduling Algorithms
4. Implementation of Semaphores
5. Implementation of Shared memory
6. Bankers Algorithm for Deadlock Detection & Avoidance
7. Implementation of the following Memory Allocation Methods for fixed partition
 - a) First Fit
 - b) Worst Fit
 - c) Best Fit
8. Implementation of the following Page Replacement Algorithms
 - a) FIFO
 - b) LRU
 - c) LFU



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9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model
10. Setting up access control lists of files and directories and testing the lists in Linux.
11. Learn to enable and disable address space layout randomization
12. **Lab Setup and Environment Configuration**

Install and configure Kali Linux on a virtualization platform (VirtualBox/VMware).

Setup Metasploitable2 (vulnerable VM) as a target for testing.

Familiarization with Linux command line, file system hierarchy, and bash scripting.

13. **Information Gathering & Reconnaissance**

Use **Nmap** to scan for open ports, services, and OS detection.

Perform passive information gathering using tools like **Whois**, **DNSrecon**, and **Maltego**.

Total Hours: 45

Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Understand: Unix Basics, Linux file hierarchy, and the theory behind Bell-LaPadula/Biba models	L1,L2	-
CO2	Apply: Practicing chmod, setuid, setgid, and implementing System Calls (fork, exec, stat)	L3	PO1
CO3	Analyze: Calculating wait times in CPU Scheduling and comparing Page Replacement (FIFO vs LRU vs LFU) or Memory Allocation (Best/Worst/First Fit)	L4	PO2
CO4	Design: Writing programs for Semaphores (Producer-Consumer), Shared Memory, and the Banker's Algorithm for deadlock avoidance	L5	PO3
CO5	Evaluate: Setting up Kali/Metasploitable, testing Access Control Lists (ACLs), managing ASLR, and performing Nmap reconnaissance to assess target security	L5-L6	PO4



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Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	2	1	-	3	3	2
CO3	3	3	2	3	3	-	-	-	-	-	-	3	2	3
CO4	3	3	3	2	3	-	-	-	-		-	3	3	2
CO5	3	3	3	2	2	-	-	-	2	1	-	3	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date : 12/03/2026.



GOVERNMENT COLLEGE OF ENGINEERING, BARGUR- 635104

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Department of CSE - CYBER SECURITY



Subject Code	25YPC409	Subject Title	DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY
Category	Professional Core	L-T-P-C	0-0-3-1.5
Regulation	2025	Semester	IV
Prerequisites			

Course Objectives:

1. To design and implement robust database structures using DDL and DML commands.
2. To develop expertise in extracting and transforming data through sophisticated SQL querying.
3. To extend database functionality beyond static storage using server-side logic.
4. To manage secure data access and protect databases from external vulnerabilities.
5. Identifying and defending against SQL Injection (SQLi) attacks.
6. Applying cryptographic techniques to ensure Data-at-Rest encryption and secure retrieval.

Practical Exercises:

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins GE
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQLi attacks given in the previous exercise.
11. Write queries to insert encrypted data into the database and to retrieve the data using decryption

Total Hours: 45



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Upon successful completion of this course, students will be able to:

CO	Course Outcome	Bloom's Level	POs Mapped
CO1	Understand: Explain the fundamental concepts of relational database architecture, the role of integrity constraints, and the mechanics of SQL injection vulnerabilities within web applications.	L1,L2	-
CO2	Apply: Demonstrate proficiency in managing data using DDL and DML commands, and implement procedural logic through stored procedures, functions, and triggers to automate database tasks.	L3	PO1
CO3	Analyze: Examine complex datasets by implementing diverse Join operations and subqueries, while auditing database transactions using DCL and TCL commands to ensure data consistency.	L4	PO2
CO4	Design: Architect a secure, multi-table relational schema that incorporates referential integrity and encrypted data storage to protect sensitive information from unauthorized access.	L5	PO3
CO5	Evaluate: Assess database systems for security flaws by simulating SQL injection attacks and validate the effectiveness of defensive programming techniques and parameterized queries.	L5-L6	PO4

Course Articulation matrix:

CO	Program Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	2	-	-	-	1	-	-	1	2	2
CO3	2	3	2	2	-	-	-	-	-	-	-	-	2	1
CO4	2	2	3	2	2	-	-	2	-	-	-	2	3	3
CO5	3	3	3	2	2	-	-	-	2	1	-	2	3	3

Correlation Levels: 3 - Strong, 2 - Medium, 1 - Low, - (dash) - No correlation

Course Designed By

Dr.K.Kumar

Associate Professor

Name & Designation

BOS Approval

Date : 12/03/2026.