SAVEETHA ENGINEERING COLLEGE

AUTONOMOUS

Affiliated to Anna University Approved by AICTE

Department of Computer Science and Engineering

UNDERGRADUATE PROGRAMME

BE Computer Science and Engineering (Internet of Things)

Regulation 2019

CURRICULUM AND SYLLABUS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

To uniquely position the department and to establish synergistic relationships across the entire spectrum of disciplines involved with computing by our faculty contributing to Computer Science and devoting themselves to take the maximal advantage of modern Computer Science to solve a wide range of complex, scientific, technological and social problems.

MISSION

- To pursue our vision by striving for excellence in creating, applying, and imparting knowledge in Computer Science and Engineering.
- To pursue a comprehensive educational system, research in collaboration with industry and Government and to disseminate knowledge through scholarly publications.
- To provide service through professional societies to the community, the state, and the nation.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- Graduates, within four years of graduation, should demonstrate peer-recognized expertise together with the ability to articulate that expertise and use it for contemporary problem-solving in the analysis, design, implementation and evaluation of IoT systems.
- Graduates, within four years of graduation, should demonstrate engagement in the engineering profession, locally and globally, by contributing to the ethical, competent, and creative practice of engineering or other professional careers.

- Graduates, within four years of graduation, should demonstrate sustained learning and adapt to a constantly changing field through graduate work, professional development, and self-study.
- Graduates, within four years of graduation, should demonstrate leadership and initiative to ethically advance professional and organizational goals, facilitate the achievements of others, and obtain substantive results.
- Graduates, within four years of graduation, should demonstrate a commitment to teamwork while working with others of diverse cultural and interdisciplinary backgrounds.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development Of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

1. **Professional Skills:** Design and analyze optimal solutions to real-world problems in IoT.
2. **Technical Skills:** Design computing systems based on IOT.
3. **Entrepreneurship Skills:** Ability to lead an embedded product development company/team.
4. **Research Skills:** Ability to identify real-world research problems and provide IOT based solutions.

CATEGORIZATION OF COURSES

A. HUMANITIES AND SCIENCE COURSES (Minimum Credits to be earned: 12)							
S. NO.	CODE	COURSE TITLE	HOURS PER WEEK			C	MIN CREDITS **
			L	T	P		
1	19EN104	Technical Writing	3	0	0	3	3
2	19EN105	Public Speaking	0	0	6	3	
3	19EN101	Communicative English	3	0	2	4	
4	19MS154	Basic Financial Accounting*	3	0	0	3	3
5	19MS156	Human Resource Management and Team Building*	3	0	0	3	3
6	19MS155	Stock Market and Company Operations*	3	0	0	3	3
*Courses exempted for lateral entry students ** Minimum credits to be earned							

B. BASIC SCIENCE COURSES (Minimum Credits to be earned: 25)							
S. NO.	CODE	COURSE TITLE	HOURS PER WEEK			C	MIN CREDITS **
			L	T	P		
1	19MA220	Mathematics for Artificial Intelligence	4	0	0	4	4
2	19MA221	Linear Algebra Laboratory	0	0	4	2	2
3	19CY205	Principles of Chemistry in Engineering*	3	0	2	4	4
4	19PH214	Physics for Quantum Computing*	3	0	0	3	3
5	19MA222	Probability And Queueing Models	3	0	2	4	4
6	19MA219	Transforms And Its Applications	3	1	0	4	4

7	19MA211	Statistics And Numerical Methods	3	0	2	4	4
*Courses exempted for lateral entry students ** Minimum credits to be earned							

C. ENGINEERING SCIENCE COURSES (Minimum Credits to be earned: 28)							
S. NO.	CODE	COURSE TITLE	HOURS PER WEEK			C	MIN CREDITS**
			L	T	P		
1	19AI301	Python Programming	2	0	2	3	3
2	19AI302	Engineering Design And Modelling*	0	0	6	3	3
3	19AI303	Engineering Mechanics and Product Development*	2	0	2	3	3
4	19AI306	Object Oriented Programming using C++	2	0	2	3	3
5	19AI307	Object Oriented Programming using Java	2	0	2	3	
6	19AI308	Object Oriented Programming using C#	2	0	2	3	
7	19EE404	Digital Electronics*	3	0	2	4	4
8	19EE305	Basic Electrical, Electronics And Measurement Engineering*	2	0	2	3	3
9	19EC408	Microprocessor and Microcontroller	3	0	2	4	4
10	19AI304	Fundamentals of C Programming	2	0	2	3	3
11	19AI305	Advanced C Programming	2	0	2	3	3
*Courses exempted for lateral entry students ** Minimum credits to be earned							

D. PROFESSIONAL CORE COURSES (Minimum Credits to be earned: 55)

S. NO.	CODE	COURSE TITLE	HOURS PER WEEK			C	MIN CREDITS**
			L	T	P		
CS CORE							
1	19AI401	Fundamentals Of Web Technology	3	0	0	3	3
2	19AI402	Web Technology Laboratory	0	0	4	2	2
3	19CS405	Operating System*	3	0	2	4	4
4	19CS406	Computer Networks*	3	0	2	4	4
5	19CS404	Database Management System and Its Applications	3	0	2	4	4
6	19AI408	Data Structures	2	0	2	3	3
7	19AI404	Analysis Of Algorithms	2	0	2	3	3
8	19CS407	Theory Of Computation	3	0	0	3	3
9	19CS408	Software Engineering	3	0	2	4	4
10	19CS409	Compiler Design	3	0	2	4	4
11	19CS305	Computer Architecture	3	0	0	3	3
IoT CORE							
12	19AM506	Sensors And Actuators For Iot	2	0	2	3	3
13	19AM507	Security And Trust In Iot	2	0	2	3	3
14	19AM508	Introduction To Iot	3	0	0	3	3
15	19AM509	Industrial Internet Of Things	2	0	2	3	3
16	19AM510	Software For Embedded Systems	2	0	2	3	3
17	19AM511	Iot Architecture And Protocols	3	0	0	3	3

*Courses exempted for lateral entry students ** Minimum credits to be earned

E. PROFESSIONAL ELECTIVE COURSES
(Minimum Credits to be earned: 16)

S. NO.	CODE	COURSE TITLE	HOURS PER WEEK			CREDITS
			L	T	P	
ARTIFICIAL INTELLIGENCE						
1	19AI405	Fundamentals Of Artificial Intelligence	2	0	2	3
2	19AI409	Applied Artificial Intelligence	2	0	2	3
3	19AI501	Applications Of AI	2	0	2	3
4	19AI507	Special Topics In Artificial Intelligence	2	0	2	3
5	19AI503	Computer Vision	2	0	2	3
6	19AI514	Self Driving Car	2	0	4	4
7	19AI522	Knowledge Engineering	3	0	0	3
MACHINE LEARNING						
1	19AI502	Applied Natural Language Processing	2	0	2	3
2	19AI410	Introduction to Machine Learning	2	0	2	3
3	19AI411	Neural Networks	2	0	2	3
4	19AI506	Speech Processing	2	0	2	3
5	19AI413	Deep Learning	2	0	2	3
6	19AI521	Expert Systems	3	0	0	3
7	19AI505	Reinforcement Learning	2	0	2	3
8	19AM501	Machine Learning For Bioinformatics	3	0	0	3
9	19AM502	Genetic Algorithms	2	0	2	3
CYBER SECURITY						
1	19AI526	Information Security And Access Control	2	0	2	3
2	19AI527	Security Assessment And Risk Analysis	3	0	2	4
3	19AI532	Information Theory For Cyber Security	2	0	2	3
4	19AI536	Steganography And Digital Watermarking	2	0	2	3

5	19AI547	Blockchain for Business	2	0	2	3
6	19XX401	Cryptography And Network Security	2	0	2	3
7	19XX402	Ethical Hacking	3	0	0	3
8	19XX403	Firewalls & Intrusion Detection System	2	0	2	3
9	19XX404	Secure Software Engineering	3	0	0	3
10	19XX405	System Security	3	0	0	3
11	19XX406	Blockchain And Cryptocurrency	3	0	0	3
12	19XX407	Cyber Forensics	3	0	0	3
ROBOTICS & AR/VR						
1	19AI533	Introduction To Robotics	2	0	2	3
2	19AI534	Kinematics And Dynamics Of Robots	2	0	2	3
3	19AI535	Robotic Sensors	2	0	2	3
4	19AI530	Control Of Robotic Systems	2	0	2	3
5	19AI509	Concepts Of Virtual And Augmented Reality	2	0	2	3
6	19AI510	Mobile VR And AI In Unity	2	0	2	3
7	19AI513	Game Programming	2	0	4	4
8	19AI537	Computer Graphics For Virtual Reality	2	0	2	3
9	19AM514	Motion Planning Techniques	2	0	2	3
WEB TECHNOLOGIES						
1	19AI539	Mobile User Interface Development	2	0	2	3
2	19AI540	Programming Mobile Devices	2	0	2	3
3	19AI545	Modern Web Application Development	2	0	2	3
4	19AI546	Web Server Programming	2	0	2	3
DATA SCIENCE						
1	19AI403	Introduction to Data Science	2	0	2	3
2	19AM505	Statistical Learning Theory	2	0	2	3

3	19AI511	Scientific And Engineering Data Visualization	2	0	2	3
4	19AI407	Parallel Computing Architecture	3	0	2	4
5	19AI516	Big Data Analytics	2	0	2	3
6	19AI517	Business Analytics	2	0	2	3
7	19AM503	Data Modeling	3	0	0	3
IoT						
1	19XX501	Python Programming for IoT	3	0	0	3
2	19XX502	Applications of IoT in Robotics	3	0	0	3
3	19XX503	Programming for IoT Boards	3	0	0	3
4	19XX504	Design of Smart Cities	3	0	0	3
5	19XX505	IoT and Multimedia Technology	3	0	0	3
6	19XX506	Mobile Application Development for IoT	3	0	0	3
7	19XX507	Open Source Programming for IoT	3	0	0	3
8	19EC508	Ad hoc and Wireless Sensor Networks	3	0	0	3
9	19AM513	Raspberry Pi For Iot	2	0	2	3
10	19AM512	Arduino For Iot	2	0	2	3
CSE						
1	19AI538	Mathematical Modelling And Computer Aided Engineering	2	0	2	3
2	19AI541	Cloud Computing	3	0	2	4
3	19AI542	Agile Software Development	3	0	2	4
4	19AI543	Software Testing	2	0	2	3
5	19AI544	Virtualization And Containerization	2	0	2	3
6	19AI528	Advanced Graph Theory And Applications	2	0	2	3
7	19AI529	Advanced Data Structures	2	0	2	3
8	19AI508	Soft Computing	2	0	2	3
9	19AI515	Smart Manufacturing Technology	2	0	2	3

10	19CS523	Information Retrieval	3	0	0	3
11	19AI512	NoSQL Database Design	2	0	2	3
12	19AI518	Cognitive Systems	3	0	0	3
13	19AI519	Distributed Database	3	0	0	3
14	19AI520	Data Warehousing And Data Mining	2	0	2	3
15	19AI523	Mobile Database	3	0	0	3
16	19AI524	Multimedia Database	3	0	0	3
17	19AI525	Video Processing	2	0	2	3
18	19AI406	Digital Image Processing Techniques	2	0	2	3
19	19AI407	Parallel Computing Architecture	3	0	2	4
20	19AI412	Web Data Mining	3	0	2	4

F. OPEN ELECTIVE COURSES
(Credits to be earned: 12)

S. NO.	CODE	COURSE TITLE	CREDITS	REMARKS
1		Open Elective Courses	8	Courses offered by other departments
2	19OC601	Online Course 1	2	Approved Courses
3	19OC602	Online Course 2	2	

#Course will be offered by the Institution / Department in collaboration with industry.

G. EMPLOYABILITY ENHANCEMENT COURSES
(Credits to be earned: 16)

S. NO.	CODE	COURSE TITLE	HOURS PER WEEK	CREDITS	PREREQUISITE

			L	T	P		
1	19AI701	Mini Project	0	0	2	1	NIL
2	19AI702	Project Work I	0	0	6	3	NIL
3	19AI703	Project Work II	0	0	12	6	NIL
4	19EY701	Soft Skills	0	0	2	1	NIL
5	19EY702	Creative Skills for Communication	0	0	2	1	NIL
6	19EY703	System of Numerical and Logical Terminologies	0	0	2	1	NIL
7	19EY704	Advanced Quantitative and Logical Reasoning	0	0	2	1	NIL
8	19EY705	Employment Enhancement Skills	0	0	2	1	NIL
9	19EY706	Company-Specific Assessments for Employability	0	0	2	1	NIL
*Courses exempted for lateral entry students							

H. MANDATORY COURSES (Credits to be earned: 3)			
S. NO.	**CODE**	**COURSE TITLE**	**CREDITS**
1	19MC801	Professional Ethics	0
2	19MC802	Environmental Science	0
3	19MC803	Constitution of India	0
4	19MC804	Internship/Entrepreneurship/Consultancy	2*
5	19MC805	Inplant Training	1*
6	19MC807	NSS#	0
7	19MC808	NSO#	0
8	19MC809	YRC#	0

* Credits not included for CGPA. # Any one course to be taken

LIST OF OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS

S.No.	Course Code	Course Title	L	T	P	C	Prerequisite
AGRICULTURE ENGINEERING							
1	19AG601	Principles of Crop Production	2	0	2	3	NIL
2	19AG514	Food Packaging Technology	2	0	2	3	NIL
3	19AG509	Human Engineering and Safety	2	0	2	3	NIL
4	19AG424	Remote Sensing and GIS Applications	2	0	2	3	NIL
5	19AG421	Dairy and Food Engineering	2	0	2	3	NIL
BIOMEDICAL ENGINEERING							
6	19BM601	Fundamentals of Nutrition	3	0	0	3	NIL
7	19BM602	Biomedical Waste Management	3	0		3	NIL
8	19BM603	Healthcare Technologies	3	0	0	3	NIL
9	19BM604	Prosthetic Engineering	3	0	0	3	NIL
10	19BM605	Medical Devices	3	0	0	3	NIL
11	19BM606	Biology for Engineers	3	0	0	3	NIL
CIVIL ENGINEERING							
12	19CE510	Integrated Water Resources Management	3	0		3	NIL
13	19CE521	Air Pollution Engineering	3	0	0	3	NIL
14	19CE525	Traffic Engineering	3	0	0	3	NIL
15	19CE527	Construction Engineering and Occupational Safety	3	0	0	3	NIL

16	19CE528	Contract Laws and Regulations	3	0	0	3	NIL

ELECTRICAL AND ELECTRONICS ENGINEERING							
17	19EE601	Embedded Based Product Design and Development	3	0	0	3	NIL
18	19EE602	Electrical Safety	3	0	0	3	NIL
19	19EE603	Renewable Energy Sources	3	0	0	3	NIL
20	19EE604	Fundamentals of Electric Power Utilization	3	0	0	3	NIL
21	19EE605	Industrial Automation and Robotics	3	0	0	3	NIL
22	19EE606	Solar Photovoltaic Energy	2	0	2	3	NIL
ELECTRONICS AND COMMUNICATION ENGINEERING							
23	19EC601	Electronic Packaging	3	0	0	3	NIL
24	19EC602	Introduction To Micro Electro Mechanical Systems	3	0	0	3	NIL
25	19EC603	Fuzzy Logic Systems And ANN	3	0	0	3	NIL
26	19EC604	Consumer Electronics	3	0	0	3	NIL
27	19EC605	Electronic System Design	3	0	0	3	NIL
28	19EC606	Drones for Agriculture	3	0	0	3	NIL
ELECTRONICS AND INSTRUMENTATION ENGINEERING							
29	19EI601	Electrical And Electronic Measurements	3	0		3	NIL
30	19EI602	Instrumentation And Control Systems	3	0		3	NIL
31	19EI504	Environmental Instrumentation	3	0	0	3	NIL
32	19EI508	SCADA Systems & Applications	3	0	0	3	NIL
33	19EI511	Telemetry and Tele Control	3	0	0	3	NIL

34	19BY201	Introduction to Biology	2	0	0	2	NIL
MECHANICAL ENGINEERING							
35	19ME505	Computer Aided Design	2	0	2	3	NIL
36	19ME511	Automobile Engineering	2	0	2	3	NIL
37	19ME524	Sustainable and Green Manufacturing	2	0	2	3	NIL
38	19ME529	Process Planning and Cost Estimation	2	0	2	3	NIL
39	19ME531	Intellectual Property Rights	2	0	2	3	NIL
40	19ME601	Mechatronics and Robotics	2	0	2	3	NIL
41	19ME602	Hydraulic Drives and Controls	2	0	2	3	NIL
MEDICAL ELECTRONICS							
42		Tele Health Technology	3	0	0	3	NIL
43		Bio MEMS	3	0	0	3	NIL
44		Medical Wearable Systems	3	0	0	3	NIL
45		Biomedical Sensors and Measurements	3	0	0	3	NIL
46		Biomedical Optics	3	0	0	3	NIL
CHEMICAL ENGINEERING							
47	19CH503	Energy Technology	3	0	0	3	NIL
48	19CH505	Green Technology	3	0	0	3	NIL
49	19CH511	Food Technology	3	0	0	3	NIL
50	19CH512	Drugs and Pharmaceutical Technology	3	0	0	3	NIL
51	19CH516	Corrosion Technology	3	0	0	3	NIL
INFORMATION TECHNOLOGY							
52	19IT517	Data Security	3	0	0	3	NIL

53	19IT518	Game Theory	3	0	0	3	NIL
54	19IT519	Data Analysis using R Programming	3	0	0	3	NIL
55	19IT520	Linux Fundamentals	3	0	0	3	NIL
56	19IT521	Internet Technologies	3	0	0	3	NIL
57	19IT522	Fundamentals of Databases	3	0	0	3	NIL
ENGLISH							
58	19EN601	Creative Writing	2	0	0	2	NIL
59	19EN602	English through Media	2	0	0	2	NIL
60	19EN603	Introduction to Design	0	0	4	2	NIL
61	19EN604	Design Thinking	2	0	0	2	NIL
62	19EN605	Modern Trends in Physical Education and Sports Sciences	0	0	4	2	NIL
63	19EN606	Psychology for Professionals	2	0	0	2	NIL
64	19EN607	Heritage Studies	0	0	4	2	NIL
65		MIME Theater Art	0	0	4	2	NIL
66	19EN609	Gender Sensitization	2	0	0	2	NIL
67	19EN610	French - Basic	0	0	4	2	NIL
68	19EN611	French - Advanced	0	0	4	2	19EN610
69	19EN612	Germen - Basic	0	0	4	2	NIL
70	19EN613	Germen - Advanced	0	0	4	2	19EN612
71	19EN614	Japanese - Basic	0	0	4	2	NIL
72	19EN615	Japanese - Advanced	0	0	4	2	19EN614
73	19EN616	Yoga and Meditation	0	0	2	1	NIL
74		Product Design for future	0	0	4	2	NIL
75		Indian Astronomy and Mathematics	2	0	0	2	NIL

76		Inventions and Discoveries	2	0	0	2	NIL
77	19EN620	Mandarin	0	0	4	2	NIL
78	19EN621	Spanish - Basic	0	0	4	2	NIL
79	19EN622	Spanish - Advanced	0	0	4	2	19EN621
80	19EN623	Dream, Draw and Create	0	0	4	2	NIL
MATHEMATICS							
81		Resource Management Techniques	3	0	0	3	NIL
82	19MA602	Statistics For Engineers	3	0	0	3	NIL