ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]
[Accredited by NAAC]
Dr.M.G.R. NAGAR, HOSUR, KRISHNAGIRI (DT) - 635130, TAMILNADU, INDIA

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM

B.TECH – CHEMICAL ENGINEERING

Vision:

To develop competent, proactive and creative chemical engineers to meet the global standards and expectations of engineering education.

Mission:

- To provide a congenial environment and a rigorous teaching-learning process that train students to excel in fundamental sciences, chemical and allied engineering fields
- To offer a program to inculcate good engineering design with creative thinking and leadership qualities contributing globally for technological and economical advancements.
- To foster principles of sustainability that promotes environmental friendlytechnologies with ethical values and noble ideas for the benefit of society.

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

- The graduates of the program will have sound knowledge in Mathematical, Scientific and Engineering concepts necessary to formulate, analyze, design and solve Engineering problems and to prepare them for higher learning, research and industry.
- The graduates of the program will possess innovative skills to asses and apply the rapid changes in technology and to engage in research leading to novel solutions for human, social and global competency.
- The graduates of the program will acquire knowledge and grab opportunities to work as teams on multidisciplinary environment, communicate ideas effectively with diverse audiences, leadership qualities with ethical values and engage in life-long learning.

2. PROGRAMME OUTCOMES (POS)

	Graduate Attribute	Programme Outcomes (POs)
PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project managementand finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

3. PROGRAMME SPECIFIC OUTCOMES (PSOS)

By the completion of Chemical Engineering Programme the student will have following Program-specific outcomes.

1 Graduates will apply knowledge in physics, chemistry and biology in the field of transfer processes for effective separation and purification of petrochemicals, pharmaceuticals and health care products.
2 Graduates will automate and control processes by applying mathematics, process control, instrumentation, simulation and process modeling
3 Equip Chemical Engineering graduates with integrity and ethical values so that they become responsible Engineers.

4. MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVE WITH PROGRAMME OUTCOMES

Program Educational Objectives (PEOs)	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
I	√	√	√	√	√		√				√		√	√	
II		√	√	√	√	√	√	√	√	√		√	√		√
III						√	√	√	√	√	√	√			√

Curriculum

Of

B.Tech- Chemical Engineering

Regulation-2022

Choice Based Credit System

Department of Chemical Engineering

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B.TECH- CHEMICAL ENGINEERING
REGULATION- 2022

CHOICE BASED CREDIT SYSTEM CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	122ENT01	Professional English –I	HSMC/EEC	2	0	2	3
2	122MAT02	Matrices and Calculus	BS	3	1	0	4
3	122PHT03	Engineering Physics	BS	2	0	0	2
4	122CYT04	Engineering Chemistry	BS	2	0	0	2
5	122EGT04	Engineering Graphics	ES	2	0	4	4
6	122EET06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3
7	122HST07	Heritage of Tamil*	HSMC	1	0	0	1
PRACTICALS							
8	122CYP08	Engineering Chemistry Laboratory	BS	0	0	2	1
9	122EPP09	Engineering Practice Laboratory	ES	0	0	2	1
			TOTAL				20

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	222ENI01	Professional English -II	HSMC/EEC	2	0	2	3
2	222MAT02	Probability and Statistics	BS	3	1	0	4
3	222EST03	Environmental Science and Engineering	HSMC	2	0	0	2
4	222PPT04	Python Programming	ES	3	0	0	3
5	222MST05	Material Science	BS	2	0	0	2
6	222CHT06	Organic Chemistry	BS	3	0	0	3
7	222HST07	Tamils and Technology*	HSMC	1	0	0	1
PRACTICALS							
8	222PHP08	Engineering Physics Laboratory	BS	0	0	2	1
9	222PPP09	Python Programming Laboratory	ES	0	0	2	1
			TOTAL				19

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	322MAT01	Transforms and Partial Differential Equations	BS	3	0	0	3
2	322CHT02	Chemical Process Calculations	PC	3	1	0	4
3	322CHT03	Chemical Process Industries	PC	2	0	0	2
4	322CHT04	Chemical Engineering Fluid Mechanics	ES	3	1	0	4
5	322CHT05	Mechanical Operations	PC	3	0	0	3
6	322CHI06	Instrumental Methods of chemical Analysis	ES	3	0	2	4
7	322GEV07	Professional Development*	EEC	1	0	0	1
PRACTICALS							
8	322CHP08	Applied Organic Chemistry Laboratory	BS	0	0	2	1
9	322CHP09	Fluid Mechanics Laboratory	ES	0	0	2	1
			TOTAL				22

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	422NMT01	Numerical Methods	BS	3	0	0	3
2	422CHT02	Chemical Engineering Thermodynamics	PC	3	0	0	3
3	422CHT03	Process Heat Transfer	PC	3	1	0	4
4	422CHT04	Mass Transfer I	PC	3	0	0	3
5	422CHT05	Chemical Process Plant Safety	PC	3	0	0	3
6	422CHI06	Pharmaceutical Formulation and analysis	PC	3	0	2	4
7	422GEV02	Math solver software*	EEC	1	0	0	1
PRACTICALS							
8	422CHP08	Heat Transfer Laboratory	PC	0	0	2	1
9	422CHP09	Mechanical Operations Laboratory	PC	0	0	2	1
			TOTAL				22

* The credits earned shall be over and above the total credit requirement prescribed in the curriculum for the award of degree.

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	522CHT01	Mass Transfer II	PC	3	0	0	3
2	522CHT02	Chemical Reaction Engineering I	PC	3	1	0	4
3	522CHT03	Advanced Electrochemical Energy Storage Systems	PC	3	0	0	3
4	522CHI04	Process Dynamics and Control	PC	3	0	2	4
5	522CHEXX	Professional Elective –I	PE	3	0	0	3
6	522XXOXX	Open elective -I	OE	3	0	0	3
7	522MCTXX	Mandatory Course I*	MC	1	0	0	1
PRACTICALS							
8	522CHP07	Chemical Process Computational Laboratory	PC	0	0	2	1
9	522CHP08	Energy Storage Systems Laboratory	EEC	0	0	2	1
10	522CHP09	Internship – I#	EEC	0	0	4	2
TOTAL							22

 # Minimum of 2 weeks at the end of 5th semester and 7th semester each, or a minimum of 4 weeks at the end of 7th semester.

 # Assessment for Internship / Training will be done during 6th semester.

SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	622CHT01	Chemical Reaction Engineering-II	PC	3	0	0	3
2	622CHT02	Chemical Process Plant Design and Economics	PC	3	0	0	3
3	622CHI03	Chemical Process Equipment Design	PC	3	0	2	4
4	622CHEXX	Professional Elective-II	PE	3	1	0	3
5	622CHEXX	Professional Elective-III	PE	3	0	0	3
6	622XXOXX	Open Elective II	OE	3	0	0	3
7	622MCTXX	Mandatory Course II*	MC	1	0	0	1
8	622CHVXX	Value Added Course*	EEC	1	0	0	1
PRACTICALS							
9	622CHP07	Mass Transfer Laboratory	PC	0	0	2	1
10	622CHP08	Process Design and Innovation for Chemical Engineers	EEC	0	0	2	1
TOTAL							21

SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1	722CHT01	Transport Phenomena	PC	3	1	0	4
2	722CHI02	Chemical Process Modeling and Simulation	PC	3	0	2	4
3	722CHT03	Digital Marketing	HSMC	3	0	0	3
4	722CHEXX	Professional Elective - IV	PE	3	0	0	3
5	722CHEXX	Professional Elective - V	PE	3	0	0	3
6	722CHEXX	Professional Elective - VI	PE	3	0	0	3
PRACTICALS							
7	722CHP07	Chemical Reaction Engineering Laboratory	PC	0	0	2	1
8	722CHP08	Mini project	EEC	0	0	3	2
9	722CHP09	Internship –II[#]	EEC	0	0	4	-
			TOTAL				23

[#]**Assessment for Internship / Training will be done during 8th semester.**

SEMESTER VIII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1	822CHEXX	Professional Elective –VII	PE	3	0	0	3
2	822CHEXX	Professional Elective -VIII	PE	3	0	0	3
3	822CHP01	Project Work	EEC	0	0	18	9
			TOTAL				15

Lists of Mandatory Courses

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
X22MCT01	Introduction to Women and Gender Studies	MC	1	0	0	1
X22MCT02	Elements of Literature	MC	1	0	0	1
X22MCT03	Film Appreciation	MC	1	0	0	1
X22MCT04	Disaster Management	MC	1	0	0	1
X22MCT05	Political and Economic Thought for a Humane Society	MC	1	0	0	1
X22MCT06	Health, Wellness and Fitness Management	MC	1	0	0	1
X22MCT07	Sustainable Development	MC	1	0	0	1
X22MCT08	Ethics and Human Values	MC	1	0	0	1
X22MCT09	Innovation on Biotechnology	MC	1	0	0	1
X22MCT10	Scientific Reading and Writing	MC	1	0	0	1
X22MCT11	Integrated Yoga for Promotion of positive Health	MC	1	0	0	1
X22MCT12	Fundamentals of Research Methodology	MC	1	0	0	1
X22MCT13	Well Being with Traditional practices (Yoga , Ayurveda and Siddha)	MC	1	0	0	1
X22MCT14	History of Science and Technology in India	MC	1	0	0	1
X22MCT15	State, Nation Building and Politics in India	MC	1	0	0	1
X22MCT16	Industrial safety	MC	1	0	0	1
X22MCT17	Indian Constitution	MC	1	0	0	1
X22MCT18	Human values and Professional Ethics	MC	1	0	0	1
X22MCT19	Intellectual Property Right	MC	1	0	0	1

Value Added Courses

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1	622CHV01	Introduction to mathematical modelling to chemical Engineers	EEC	1	0	0	1
2	622CHV02	Carrier opportunity for chemical Engineers	EEC	1	0	0	1
3	622CHV03	Nano Technology and its Applications	EEC	1	0	0	1
4	622CHV04	Pulp and paper Technology	EEC	1	0	0	1
5	622CHV05	Advanced Microsoft Excel for Chemical Engineers	EEC	1	0	0	1

PROFESSIONAL ELECTIVES COURSES: VERTICALS

Vertical I **Chemical Engineering Computation**	**Vertical II** **Food and Pharmaceutical Technology**	**Vertical III** **Environmental Management & Safety Engineering**	**Vertical IV** **Petroleum Technology**	**Vertical V** **Energy Engineering**	**Vertical VI** **Emerging Technologies**
Chemical Process flow sheeting	Food Processing Technology	Modern Separation Techniques	Petrochemical Unit processes	Renewable Energy Technology	Block chain development
Computational Techniques	Bioprocess Engineering	Industrial waste water Management	Petroleum formation and evaluation	Biofuels	Robots Process and Industrial Automation
Programming using MATLAB	Enzyme Technology	Air pollution Control and measuring Techniques	Petroleum exploration and exploitation techniques	Electrochemical Engineering	Artificial Intelligence
Computational Fluid Dynamics	Regulatory requirements in Pharmaceutical Industries	Solid waste management	Petroleum refining and petrochemicals	Energy Conservation and management	Machine Learning with application to object recognition
Optimization of Chemical Processes	Novel Drug Delivery System	Process hazard analysis studies	Petroleum corrosion technology	Battery and Fuel cell Technology	Powering IoT with Raspberry Pi & Arduyno
Pilot plant Scale up Methods	Validation in Pharmaceutical Industries	Health safety and Environmental management	Oil and Natural Gas Engineering	Energy Auditing	Smart and Advanced Manufacturing

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V, VI, VII and VIII. These courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I: Chemical Engineering Computation

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE01	Chemical Process flow sheeting	PE	3	0	0	3
2	X22CHE02	Computational Techniques	PE	3	0	0	3
3	X22CHE03	Programming using MATLAB	PE	3	0	0	3
4	X22CHE04	Computational Fluid Dynamics	PE	3	0	0	3
5	X22CHE05	Optimization of Chemical Processes	PE	3	0	0	3
6	X22CHE06	Pilot plant Scale up Methods	PE	3	0	0	3
			Total	**18**			**18**

Vertical II: Food and Pharmaceutical Technology

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE07	Food Processing Technology	PE	3	0	0	3
2	X22CHE08	Bioprocess Engineering	PE	3	0	0	3
3	X22CHE09	Enzyme Technology	PE	3	0	0	3
4	X22CHE10	Regulatory requirements in Pharmaceutical Industries	PE	3	0	0	3
5	X22CHE11	Novel Drug Delivery System	PE	3	0	0	3
6	X22CHE12	Validation in Pharmaceutical Industries	PE	3	0	0	3
			Total	**18**			**18**

Vertical III: Environmental Management & Safety Engineering

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE13	Modern Separation Techniques	PE	3	0	0	3
2	X22CHE14	Industrial waste water Management	PE	3	0	0	3
3	X22CHE15	Air pollution Control and measuring Techniques	PE	3	0	0	3
4	X22CHE16	Solid waste management	PE	3	0	0	3
5	X22CHE17	Process hazard analysis studies	PE	3	0	0	3
6	X22CHE18	Health safety and Environmental management	PE	3	0	0	3
			Total	**18**			**18**

Vertical IV: Petroleum Technology

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE19	Petrochemical Unit processes	PE	3	0	0	3
2	X22CHE20	Petroleum formation and evaluation	PE	3	0	0	3
3	X22CHE21	Petroleum exploration and exploitation techniques	PE	3	0	0	3
4	X22CHE22	Petroleum refining and petrochemicals	PE	3	0	0	3
5	X22CHE23	Petroleum corrosion technology	PE	3	0	0	3
6	X22CHE24	Oil and Natural Gas Engineering	PE	3	0	0	3
			Total	**18**			**18**

Vertical V: Energy Engineering

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE25	Renewable Energy Technology	PE	3	0	0	3
2	X22CHE26	Biofuels	PE	3	0	0	3
3	X22CHE27	Electrochemical Engineering	PE	3	0	0	3
4	X22CHE28	Energy Conservation and management	PE	3	0	0	3
5	X22CHE29	Battery and Fuel cell Technology	PE	3	0	0	3
6	X22CHE30	Energy Auditing	PE	3	0	0	3
			Total	**18**			**18**

Vertical VI: Emerging Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1	X22CHE31	Block chain development	PE	3	0	0	3
2	X22CHE32	Robots Process and Industrial Automation	PE	3	0	0	3
3	X22CHE33	Artificial Intelligence	PE	3	0	0	3
4	X22CHE34	Machine Learning with application to object recognition	PE	3	0	0	3
5	X22CHE35	Powering IoT with Raspberry Pi & Arduyno	PE	3	0	0	3
6	X22CHE36	Smart and Advanced Manufacturing	PE	3	0	0	3
		Total		**18**			**18**

TOTAL CREDITS

Semester	I	II	III	IV	V	VI	VII	VIII	TOTAL
Credits	20	19	22	22	22	21	23	15	164

SUMMARY

Semester / Category	I	II	III	IV	V	VI	VII	VIII	TOTAL
HS	2	4	-	-	-	-	3	-	9
BS	9	10	4	3	-	-	-	-	26
ES	8	4	9	-	-	-	-	-	21
PC	-	-	9	19	15	11	9	-	63
PE	-	-	-	-	3	6	9	6	24
OE	-	-	-	-	3	3	-	-	6
EEC	1	1	-	-	1	1	2	9	15
Total	20	19	22	22	22	21	23	15	164

List of courses proposed as Open Electives for other Department Students

COURSE CODE	COURSE TITLE	L	T	P	C
X22CHO01	Drugs and Pharmaceuticals Technology	3	0	0	3
X22CHO02	Food Technology	3	0	0	3
X22CHO03	Sugar Technology	3	0	0	3
X22CHO04	Polymer Science and Technology	3	0	0	3
X22CHO05	Process Automation	3	0	0	3
X22CHO06	Intelligent Controllers	3	0	0	3
X22CHO01	Food as Medicine	3	0	0	3
X22CHO02	Organic Farming	3	0	0	3
X22CHO03	Cosmetics and Personal health Care Products	3	0	0	3
X22CHO04	Electrochemical Engineering	3	0	0	3
X22CHO05	Corrosion Engineering	3	0	0	3
X22CHO06	Solid waste Management	3	0	0	3