NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

SCHEME OF INSTRUCTION AND SYLLABI

for M.Tech. Sustainable Energy Generation & Storage Technologies (SEG&ST) Program

(Effective from 2023-24)

DEPARTMENT OF CHEMICAL ENGINEERING

Vision and Mission of the Institute

National Institute of Technology Warangal

VISION

Towards a Global Knowledge Hub, striving continuously in pursuit of excellence in Education, Research, Entrepreneurship and Technological services to the society

MISSION

- Imparting total quality education to develop innovative, entrepreneurial and ethical future professionals fit for globally competitive environment.
- Allowing stake holders to share our reservoir of experience in education and knowledge for mutual enrichment in the field of technical education.
- Fostering product-oriented research for establishing a self-sustaining and wealth creating centre to serve the societal needs.

Vision and Mission of the Department

Department of Chemical Engineering

VISION

To attain global recognition in research and training students for meeting the challenging needs of chemical & allied industries and society.

MISSION

- Providing high quality undergraduate and graduate education in tune with changing needs of industry.
- Generating knowledge and developing technology through quality research in frontier areas of chemical and interdisciplinary fields.
- Fostering industry-academia relationship for mutual benefit and growth.

Department of Chemical Engineering:

Brief about the Department:

The department was started in the year 1964 and since then it has come a long way in educating budding chemical engineers and scholars. The department celebrated its Golden Jubilee in 2014-15. The department is operating in a new building spanning around 8000 sq. m with ample space in class rooms and laboratories since 2018. The building of the department with green ambience having aesthetic landscaping and gardening has secured first place based on its architectural elegance.

The department of Chemical Engineering offers B.Tech., M.Tech. and Ph.D programs. The department has well qualified faculty dedicated to teaching and doing research in fundamental and advanced areas. The department houses various laboratories catering to the needs of the curriculum. The Department has good experimental as well as simulation based research facilities. The faculty are actively engaged in industrial consultancy and sponsored research projects. The department has inked MoUs with some of the leading industries and Universities in India and abroad. The graduating students are absorbed into reputed firms through campus placements and good number of students are going for higher studies. The department aims at inculcating lifelong learning skills in the students. The alumni of the department are shouldering high positions in multifarious organizations.

Brief about the Programme:

This is an interdisciplinary program admitting students with different backgrounds such as Chemical Engineering, Energy Engineering, Petrochemical Engineering, Electrical Engineering, Mechanical Engineering, Metallurgical and Materials Engineering, Civil Engineering, Biotechnology and allied disciplines. The program is designed to equip students with in-depth understanding and expertise in renewable energy sources, energy conversion systems, energy storage technologies, and their integration into existing energy infrastructure. A wide range of electives are offered, which provides an opportunity to explore the branch in a desired perspective. Students devote their entire second year for the Master's dissertation Project. Students may work on projects related to energy system design, optimization, modeling and simulation, energy storage system development, or renewable energy integration. As a part of the curriculum, students get hands on experience on software packages CFD/MATLAB/ASPEN PLUS. Education and research are closely integrated within this Master's program in the field of green energy generation and sustainable energy storage technologies.

List of Programs offered by the Department:

Program	Title of the Program
B.Tech.	Chemical Engineering
M.Tech.	Chemical Engineering
	Systems and Control Engineering
	Sustainable Energy Generation & Storage Technologies
PG Diploma	Systems and Control Engineering
Ph.D.	

Note: Refer to the Rules and Regulations for M.Tech. program (weblink) given on the institute website.

SCHEME OF INSTRUCTION

M.Tech. (Sustainable Energy Generation and Storage Technologies)

Course Structure (Tentative)

I - Year, I – Semester

S. No.	Course Code	Course Title	L	T	P	Credits	Cat. Code
1	CY5301	Electrochemistry and Materials for Energy systems	3	0	0	3	PCC
2	CH5301	Energy Resources, Economics and Environment	3	0	0	3	PCC
3	CH5302	Sustainable Energy Engineering	3	0	0	3	PCC
4	CH5303	Hydrogen Generation and Storage	3	0	0	3	PCC
5	CH5304	Fuel Cell Technologies	3	0	0	3	PCC
6		Elective – I	3	0	0	3	PEC
7	CH5305	Materials Synthesis and Electrochemical Analysis Lab	0	1	2	2	PCC
8	CH5306	Energy Generation and Conversion Lab	0	1	2	2	PCC
9	CH5341	Seminar-1	0	0	2	1	SEM
		TOTAL	18	2	6	23	

I - Year, II – Semester

S. No.	Course Code	Course Title	L	T	P	Credits	Cat. Code
1	CH5351	Energy Management and Life Cycle Assessment	3	0	0	3	PCC
2	CH5352	Energy Storage Systems	3	0	0	3	PCC
3	CH5353	Battery Technologies	3	0	0	3	PCC
4		Elective – II	3	0	0	3	PEC
5		Elective – III	3	0	0	3	PEC
6		Elective – IV	3	0	0	3	PEC
7	CH5354	Energy Storage Lab	0	1	2	2	PCC
8	CH5355	Energy Systems Simulation Lab	0	1	2	2	PCC
9	CH5391	Seminar-2	0	0	2	1	SEM
		TOTAL	18	2	6	23	

Note: PCC – Professional Core Courses
PEC – Professional Elective Courses
SEM – Seminar
CVV – Comprehensive Viva-voce
DW – Dissertation Work

SCHEME OF INSTRUCTION

M.Tech. (Sustainable Energy Generation and Storage Technologies)

Course Structure

II - Year, I – Semester

S. No.	Course Code	Course Title	L	T	P	Credits	Cat. Code
1	CH 6341	Comprehensive Viva-voce				2	CVV
2	CH 6342	Dissertation Part - A				12	DW
		Total				**14**	

II - Year, II – Semester

S. No.	Course Code	Course Title	L	T	P	Credits	Cat. Code
1	CH 6399	Dissertation Part – B				20	DW
		Total				**20**	

Note: PCC – Professional Core Courses
SEM – Seminar
DW – Dissertation Work
PEC – Professional Elective Courses
CVV – Comprehensive Viva-voce

Credits in Each Semester					
Cat. Code	**Sem-I**	**Sem-II**	**Sem-III**	**Sem-IV**	**Total**
PCC	19	13	-	-	32
PEC	3	9	-	-	12
SEM	1	1	-	-	2
CVV	-	-	2	-	2
DW	-	-	12	20	32
Total	**23**	**23**	**14**	**20**	**80**

Program Elective Courses

Elective - I (I Year, I Semester)		
S. No.	**Course Code**	**Course Title**
1	CH 5311	Bioenergy and biofuels
2	CH 5312	Nuclear Power Technology
3	CH 5103	Engineering Optimization
4	CH 5115	Waste to Energy
5	EE 5301	Elements of Smart Electric Grid
6	PH 6213	Solar Energy Systems
7	ME 5513	Alternate Fuels and Emissions
8	ME 5112	Power Plant Engineering
9	ME 5113	Renewable Sources of Energy
Electives – II, III, IV (I Year, II Semester)		
S. No.	**Course Code**	**Course Title**
1	CH 5361	Energy Audit and Conservation
2	CH 5362	Thermal Energy Storage
3	CH 5363	Energy, Water and Food Nexus
4	CH 5364	Supercapacitors
5	CH 5365	Energy Technologies for Sustainable Transportation
6	CH 5366	Energy Systems for Smart Cities
7	CH 5367	Modeling and Analysis of Energy systems
8	CH 5153	Computational Fluid Dynamics
9	CH 5171	CO_2 Capture and Utilization
10	CH 5170	Statistical Design of Experiments
11	CH 5252	Data Analytics
12	EE 5114	Electric Vehicles

Note: In addition to the above listed electives, a student can also register one elective per semester from other departments and two electives per semester from other specializations of the same department, based on suitability of timetable.

DETAILED SYLLABUS

M.Tech. – Sustainable Energy Generation and Storage Technologies

Will be uploaded soon.