

# Indian Institute of Technology Tirupati

Department of Chemical Engineering (CH)

B.Tech Curriculum Template (2023 onwards)

## Semester 1

Course Code	Course	L-T-P-C
PH104L/CY104L	Introduction to Classical Physics / Chemistry for Engineers	2-1-0-3
PH103P/CY103P	Physics Laboratory / Chemistry Laboratory	0-0-3-2
MA103L	Engineering Mathematics-I	3-1-0-4
ES104M	Computer Programming	2-0-3-4
ES105L	Foundations of Engineering Mechanics	2-1-0-3
ES106L	Introduction to Electrical Systems	2-0-0-2
ES101M	Concepts in Engineering and Design	1-0-2-2
HS10XN	Language Course (P/F)	2-0-0-2
	NSO/NSS <sup>#</sup>	
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
	Semester Credits (Cumulative Credits)	22 (22)

## Semester 2

Course Code	Course	L-T-P-C
CY104L/PH104L	Chemistry for Engineers /Introduction to Classical Physics	2-1-0-3
CY103P/ PH103P	Chemistry Laboratory / Physics Laboratory	0-0-3-2
MA104L	Engineering Mathematics-II	3-0-0-3
EA105M	Engineering Drawing	2-0-2-3
EA104P	Makers Laboratory	0-0-3-2
ES108L	Introduction to Electronic Systems	2-0-0-2
ES109L	Introduction to Data Science and Machine Learning	2-1-0-3
CH101L	Chemical Process Calculations	3-1-0-4
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
	Semester Credits (Cumulative Credits)	22 (44)
Summer – Socially/locally relevant project under NSO/NSS <sup>#</sup>		

Semester 3		
Course Code	Course	L-T-P-C
CH208L	Chemical Engineering Thermodynamics – I	2-1-0-3
CH210L	Fluid and Particle Mechanics	3-1-0-4
CH213L	Process Heat Transfer	2-1-0-3
CH215M	Computational Techniques for Chemical Engineers	3-0-3-5
CH209G	Applied Process Engineering - I	- - - 1
MAE	Mathematics Elective	3-0-0-3
PH105L	Introduction to Quantum Science and Technology	2-1-0-3
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
Semester Credits (Cumulative Credits)		22 (66)

Semester 4		
Course Code	Course	L-T-P-C
CH214L	Chemical Engineering Thermodynamics – II	2-1-0-3
CH212L	Chemical Reaction Engineering	3-1-0-4
CH216L	Fundamentals of Mass Transfer	2-0-0-2
CH218L	Process Dynamics and Control	3-1-0-4
CH211P	Fluid Mechanics and Heat Transfer Laboratory	0-0-3-2
CH217G	Applied Process Engineering - II	- - - 1
ES204L	Ecology, Environment and Sustainability	2-0-0-2
HSE-1	Humanities Elective 1	3-0-0-3
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
Semester Credits (Cumulative Credits)		21 (87)
Summer – Socially/locally relevant project under NSO/NSS <sup>#</sup>		

Semester 5		
Course Code	Course	L-T-P-C
CH310L	Separation Processes	3-1-0-4
CH312L	Transport Phenomena	2-1-0-3
CH313P	Chemical Reaction Engineering Laboratory	0-0-3-2
CH314P	Process Control Laboratory	0-0-3-2
CH315G	Applied Process Engineering - III	- - - 1
DPE-1	Department Elective 1	3-0-0-3
FRE-1	Free Elective 1	3-0-0-3
HSE-2	Humanities Elective 2	3-0-0-3
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
Semester Credits (Cumulative Credits)		21 (108)

Semester 6		
Course Code	Course	L-T-P-C
CH316L	Process Synthesis and Economics	3-0-0-3
CH317M	Chemical Technology	1-0-2-2
CH318L	Bioprocess Engineering	3-0-0-3
CH319P	Separations Laboratory	0-0-3-2
CH320P	Process Design and Simulation Laboratory	0-0-3-2
DPE-2	Department Elective 2	3-0-0-3
FRE-2	Free Elective 2	3-0-0-3
FRE-3	Free Elective 3	3-0-0-3
Life Skills courses (Creative Arts / Physical Wellness / Lifestyle Management)		
Semester Credits (Cumulative Credits)		21 (129)
Summer - Industrial/Research Internship*		
* Internship is not mandatory. However, students who complete industrial or research internship (minimum of 8 weeks) will earn 2 credits against free elective in Semester 7, if recommended by the Department.. Students who complete a long industrial internship (minimum of 24 weeks) will earn 6 credits against Project 2 in Semester 8, if recommended by the Department. See the structure of the following Semesters for details.		

**Choice of Study Plans Available**

All students must choose one of the five study plans given below.

	Industrial/Research Internship (Min. of 8 weeks)	Extended Internship (Min. of 24 weeks)	Project 2
Study Plan A	√	×	√*
Study Plan B	√	×	×
Study Plan C	×	√	×
Study Plan D	×	×	√*
Study Plan E	×	×	×
* For these study plans, as per the Senate resolution, it is necessary to obtain Grade B or better in Project 1 done during Semester 7.			

- For Study Plans A and B: Industrial/Research Internship must be done after completion of Semester 6 and before beginning of Semester 7 for a minimum of 8 weeks.
- For Study Plan C: Extended Internship must be done after completion of Semester 6 and before beginning of Semester 8 for a minimum of 24 weeks.
- For Study Plans D and E: No internship activity during summer after Semester 6 or in Semester 7.

**Study Plan A (for B.Tech. programs)**

Students must have grade B or better in Project 1 to choose this study plan

Course Code	Course	L-T-P-C
<b>Semester 7</b>		
CH491G	Project Phase - I	--- 3
DPE-3	Department Elective 3	3-0-0-3
DPE-4	Department Elective 4	3-0-0-3
CH391G	Industrial/Research Internship (Evaluation of internship to be done in the preceding summer, P/F course)	--- 2
	Semester Credits (Cumulative Credits)	11 (140)
<b>Semester 8</b>		
CH492G	Project Phase - II	--- 6
FRE-4	Free Elective 4	3-0-0-3
HS4XXL	Professional Ethics	1-0-0-1
	Semester Credits (Cumulative Credits)	10 (150)

**Study Plan B (for B.Tech. programs)**

Course Code	Course	L-T-P-C
<b>Semester 7</b>		
CH491G	Project Phase - I	--- 3
DPE-3	Department Elective 3	3-0-0-3
DPE-4	Department Elective 4	3-0-0-3
CH391G	Industrial/Research Internship (Evaluation of internship to be done in the preceding summer, P/F course)	--- 2
	Semester Credits (Cumulative Credits)	11 (140)
<b>Semester 8</b>		
DPE-5	Department Elective 5	3-0-0-3
DPE-6	Department Elective 6	3-0-0-3
FRE-4	Free Elective 4	3-0-0-3
HS4XXL	Professional Ethics	1-0-0-1
	Semester Credits (Cumulative Credits)	10 (150)

**Study Plan C (for B.Tech. programs)**

Course Code	Course	L-T-P-C
<b>Semester 7</b>		
CH392G	Industrial/Research Internship (Evaluation of internship to be done before beginning of Semester 8, P/F course)	--- 6
	Semester Credits (Cumulative Credits)	6 (135)
<b>Semester 8</b>		
CH491G	Project Phase - I	--- 3
DPE-3	Department Elective 3	3-0-0-3
DPE-4	Department Elective 4	3-0-0-3
FRE-4	Free Elective 4	2-0-0-2
FRE-5	Free Elective 5	3-0-0-3
HS4XXL	Professional Ethics	1-0-0-1
	Semester Credits (Cumulative Credits)	15 (150)

**Study Plan D (for B.Tech. programs)**

Students must have grade B or better in Project 1 to choose this study plan

Course Code	Course	L-T-P-C
<b>Semester 7</b>		
CH491G	Project Phase - I	--- 3
DPE-3	Department Elective 3	3-0-0-3
DPE-4	Department Elective 4	3-0-0-3
FRE-4	Free Elective 4	2-0-0-2
	Semester Credits (Cumulative Credits)	11 (140)
<b>Semester 8</b>		
CH492G	Project Phase - II	--- 6
FRE-5	Free Elective 5	3-0-0-3
HS4XXL	Professional Ethics	1-0-0-1
	Semester Credits (Cumulative Credits)	10 (150)

**Study Plan E (for B.Tech. programs)**

Course Code	Course	L-T-P-C
<b>Semester 7</b>		
CH491G	Project Phase - I	- - - 3
DPE-3	Department Elective 3	3-0-0-3
DPE-4	Department Elective 4	3-0-0-3
FRE-4	Free Elective 4	2-0-0-2
	Semester Credits (Cumulative Credits)	11 (140)
<b>Semester 8</b>		
DPE-5	Department Elective 5	3-0-0-3
DPE-6	Department Elective 6	3-0-0-3
FRE-5	Free Elective 5	3-0-0-3
HS4XXL	Professional Ethics	1-0-0-1
	Semester Credits (Cumulative Credits)	10 (150)

**Details of NSS Activity and Socially/Locally Relevant Project**

At present 80 hours of NSS work is mandatory requirement for UG degree. A student is allowed to earn these hours by participating in different activities organized by the NSS team.

In the proposed curriculum NSS activity will be divided into three segments for a total of 90 hours.

- (a) 30 hours of mandatory participation in activities organized by the NSS team as earlier.
- (b) 30 hours of mandatory project work in a socially/locally relevant project during the summer after Semester 2. The student will identify, formulate and propose a solution to socially/locally relevant issues. The students are encouraged to work in their local communities. NSS team will form detailed guidelines for the same.
- (c) The project work in point (b) will be evaluated by an appropriate committee formed by NSS.
- (d) If the project is recommended for the next phase, in the summer after Semester 4 the students can complete the same and submit a final report to earn 30 hours of work.
- (e) If the project is not recommended by the NSS committee, then the student must earn another 30 hours through regular NSS activity.

Few of the best projects, if any, will be recognized and recommended by the NSS committee to the Institute's Innovation Council for consideration of financial support.

**Details of Life Skills courses**

To complete this course requirement, a student must register in any of the Life Skills courses such as creative arts (music/dance/painting etc.), physical wellness (sports/yoga/martial arts etc.) and lifestyle management courses (organized by GCU/health center etc.) during course registration on ERP. These activities (of about 30 hours) must be completed by Semester 6 with a Pass Grade.