GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: PROJECT
(COURSE CODE: 3360508)

Diploma Programme in which this course is offered	Semester in which offered
Chemical Engineering	SIXTH

1. RATIONALE

Development of a plant for any chemical product is a big job. It requires preparing a comprehensive report of chemical process and unit operations specific to that product. It is necessary to study the properties of raw materials and product, economic factors, safety features and pollution issues. Calculation of material and energy consumption is very important for designing the plant. Specifications for major equipments, plant layout and location are to be dealt with great care. In view of all these a chemical engineering student must be able to prepare a project report for a particular chemical product including all above aspects to become an entrepreneur. A chemical product can be selected from various chemical sectors like Petrochemicals, Fertilizers, Pharmaceuticals, Pesticides, Natural products, Polymers, Acid and Alkalis, Speciality chemicals, Dyes and pigments etc.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- To prepare a project report for a particular chemical product including important feature

3. COURSE OUTCOMES

1. Select a chemical product based on market survey
2. Carry out literature survey for selected product
3. Calculate material balance for major equipments
4. Select a suitable site and prepare plant layout
5. Estimate economic evaluation
6. Prepare MSDS and select waste treatment methods

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
0	0	8	8	00	00	80	120	

Legends: L - Lecture; **T -** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C -** Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Project Report *of* a selected chemical product	1. Select a chemical product based on market survey	1. Selection of chemical product from various chemical sectors like Petrochemicals, Fertilizers, Pharmaceuticals, Pesticides, Natural products, Polymers, Acid and Alkalis, Speciality chemicals, Dyes and pigments etc.
	2. Describe introduction, history, present status and list of industries manufacturing the product	2. Introduction, history, present status and list of industries manufacturing the product
	3. Discuss Chemical, physical Properties and applications	3. Chemical and physical Properties of raw materials, product and applications of product
	4.1 Explain manufacturing processes with detailed flow diagram 4.2 Select most suitable process	4. Various manufacturing processes with flow diagram and selection of most suitable process
	5. List out and describe major equipments and Instruments	5. Major equipments and Instruments required for selected process
	6. Prepare material balance calculations	6. Material balance of selected process
	7. Describe various utilities	7. Utilities for selected process
	8.1 Explain Site selection parameters 8.2 Select suitable Plant location 8.3 Prepare plant layout	8. Site selection parameters, Plant location and layout
	9. Prepare Economic evaluation of plant	9. Economic evaluation of plant
	10.1 Prepare MSDS of raw materials and product 10.2 Discuss appropriate waste treatment method	10. Important aspects of Safety and Pollution control 10.1 MSDS of raw materials and product 10.2 Gaseous/Liquid/Solid waste treatments

Unit	Major Learning Outcomes	Topics and Sub-topics
Project Report *of* a selected chemical product	1. Select a chemical product based on market survey	1. Selection of chemical product from various chemical sectors like Petrochemicals, Fertilizers, Pharmaceuticals, Pesticides, Natural products, Polymers, Acid and Alkalis, Speciality chemicals, Dyes and pigments etc.
	11. Conclude and prepare list of references	11. Conclusion and references

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Course contains Practical part only						

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills **(Outcomes in cognitive, psychomotor and affective domain)** so that students are able to acquire the competencies. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain*

S. No.	Chapter No.	Practical/Exercise	Apprx. Hrs. Required
1	I	Selection of chemical product from various chemical sectors like Petrochemicals, Fertilizers, Pharmaceuticals, Pesticides, Natural products, Polymers, Acid and Alkalis, Speciality chemicals, Dyes and pigments	4
2	II	Introduction, history, present status and list of industries of product	8
3	III	Chemical and physical Properties of raw materials, product and applications of product	8
4	IV	Various manufacturing processes with flow diagram and	12

S. No.	Chapter No.	Practical/Exercise	Apprx. Hrs. Required
		selection of most suitable process	
5	V	Major equipments and Instruments required for selected process	8
6	VI	Material balance of selected process	20
7	VII	Utilities for selected process	6
8	VIII	Site selection parameters, Plant location and layout	12
9	IX	Economic evaluation	18
10	X	Important aspects of Safety and Pollution control (a) MSDS of raw materials and product (b) Gaseous/Liquid/Solid waste treatments	12
11	XI	Conclusion and references	4
		TOTAL	112

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities. These could be individual and group based.

1. Course/topic based presentation

9. SPECIAL INSTRUCTIONAL STRATEGY (IF ANY)

1. Industrial visit

10 SUGGESTED LEARNING RESOURCES

A. List of Books:

Sr. No.	Title of Books	Author	Publication
1	Encyclopedia of Chemical Processing and Design	Jhon J. McKetta, William A. Cunninghalm	Marcel Dekker Inc., New York and Basel
2	Encyclopedia of Chemical Technology	Kirk and Othmer	John Wiley and Sons, Wiley Interscience
3	Ullman's Encyclopedia of Industrial Chemistry	Ullman	VCH Publishers, Germany
4	Chemical Process Technology Encyclopedia	Coincidine	McGraw-Hill
5	Perry's Chemical Engineers' Handbook	Robbert H. Perry, Down W. Green	McGraw-Hill
6	Plant Design and Economics for Chemical Engineers	Max Peters, Klaus Timmerhaus	McGraw Hill
7	Chemical Engineering Plant Design	Frank C. Vilbrandt, Charles E. Dryden	McGraw Hill
8	Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design	Gavin Towler, R. K. Sinnott	Butterworth-Heinemann
9	Process Engineering	James R. Couper	Marcel & Dekker

	Economics		
10	Stoichiometry	B. I. Bhatt, S.M. Vora	Tata McGraw Hill
11	Safety and Accident Prevention in Chemical Operation	Faweett, Wood	Interscience Publishers
12	A course in Industrial Safety	K.U. Mistry	N.K.M. Publication
13	Pollution Control in Process Industries	S.P. Mahajan	Tata-McGrawHill
14	Safe Handling of Hazardous Chemicals	A.K. Rohatgi	J.K. Enterprise

B. List of Software/Learning Websites

1. http://www.sbioinformatics.com/design_thesis/design-2520thesis.htm
2. http://npcs.in/projects/
3. http://www.niir.org/books/book/detailed-project-profiles-on-9-selected-chemical-industries
4. http://avogadro.chem.iastate.edu/MSDS/

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. N. N. Hansalia, Lecturer in Chemical engineering, Government Polytechnic, Rajkot**
- **Prof. R. R. Vasava, Lecturer in Chemical engineering, Shri K. J. Polytechnic, Bharuch**
- **Prof. J. R. Vadher, Lecturer in Chemical engineering, Sir B P T I, Bhavnagar**
- **Prof. Ku. P. H. Shukla, Lecturer in Chemical engineering,, Sir B P T I, Bhavnagar**

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Abhilash Thakur. Associate Professor, Department of Applied Sciences NITTTR Bhopal**
- **Dr. Bashirullah Shaikh, Assistant Professor, Department of Applied Sciences NITTTR Bhopal**