هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**EQUIPMENT DESIGN AND DRAWING**
Course Code:	**115 CHET**
Program:	**Chemical Engineering Technology (CHET)**
Department:	**Chemical Engineering Technology**
College:	**College of Applied Industrial Technology (CAIT)**
Institution:	**Jazan University**
Version:	**V2022-Eng-revised**
Last Revision Date:	**20-04-2024**

Table of Contents:

A. General information about the course:

Course Identification	
1. Credit hours:	3 hours **(Contact hours: 3 hours/ week)**
2. Course type	
a. University ☐ College ☐ Department ■ Track☐ Others☐	
b. Required ■ Elective☐	
3. Level/year at which this course is offered:	**Level 4/ Second Year**
4. Course general Description Engineering design of new chemical and petrochemical plants and the development or revision of existing ones require the use of engineering principles and theories combined with a practical realization of the limits imposed by industrial conditions. A successful engineer requires more than a knowledge and understanding of the basic sciences and the associated engineering subjects such as thermodynamics, fluid mechanics, heat and mass transport, reaction kinetics, and computer technology. The engineer must also have the ability to apply this knowledge to practical situations for the purpose of accomplishing something that will be beneficial to society. This course introduces the students and practicing engineers to the practices and standards of blueprinting the different equipment used in chemical, and allied process industries. It prefaces to the symbolic representations of the equipment. It also provides the detailed drawings of some commonly used equipment that are repeatedly used in chemical engineering unit operations.	
5. Pre-requirements for this course (if any): **011 MMET**	
6. Co- requirements for this course (if any): None	
7. Course Main Objective(s) This course introduces the students to practice and drafting the symbolic representations of equipment used in chemical, petroleum refining, petrochemical, paper mills, iron and steel, food processing, polymer engineering, pharmaceutical processing industries and other sectors such as electronic materials and devices, mining and metals extraction, biomedical industry, and power generation units. It provides the detailed drawings of some commonly used equipment that are frequently used in different sizes and shapes.	

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	42 (14+28)	100
2.	E-learning	--	--
3.	Hybrid • Traditional classroom • E-learning	--	--
4.	Distance learning	--	--

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	14
2.	Laboratory/Studio	28
3.	Field	--
4.	Tutorial	--
5.	Others (specify)	--
	Total	42

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	State the basic concepts of process design, development and general design considerations.	K1	• Lectures/Presentations • Lectures • Auto CAD Lab Tutorials	• Quizzes/ • Mid exam • Assignment • Class Activity • Final Exam
2.0	Skills			
2.1	Identify chemical, process equipment and instruments based on symbols.	S1	• Lectures / • Presentations • Lectures • Auto CAD Lab Tutorials	• Quizzes/ • Mid exam • Assignment • AutoCAD Lab • Class Activity • Final Exam
2.2	Apply fundamental chemical and Process Engineering theories to design various process units.	S2	• Lectures / • Presentations • Lectures • Auto CAD Lab Tutorials	• Quizzes/ • Mid exam • Assignment • AutoCAD Lab • Class Activity • Final Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Draw process flow diagrams using symbols used in chemical and process engineering and using AutoCAD.	S3	• Lectures / Presentations • Lectures • Auto CAD Lab Tutorials	• Quizzes/ • Mid exam • Assignment • AutoCAD Lab • Class Activity Final Exam
2.4	Design heat exchangers, evaporators, absorbers, distillation columns, reactors and filters and using AutoCAD.	S3	• Lectures / Presentations • Lectures • Auto CAD Lab Tutorials	• Quizzes/ • Mid exam • Assignment • AutoCAD Lab • Class Activity Final Exam
3.0	Values, autonomy, and responsibility			
3.1	Show independent timeliness, work in clasoom with effective contribution with classmates.	V1	• Group Discussion • Active learning • Auto CAD Lab Tutorials	• Lab Exercise • Marks will be given according to participation in classroom, Lab exam
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Drawing of process equipment symbols for fluid handling, heat transfer, mass transfer	3
2.	Drawing/theory of process equipment symbols for vessels, conveyors and feeders etc.	4
3.	Drawing/theory of process equipment symbols for, separators, mixing & comminution etc.	3
4.	Drawing/theory of process equipment symbols for distillation, dryers, evaporators, scrubbers etc.	4
5.	Drawing/theory of process equipment symbols for crystallizer, grinding, jigging, elutriation, magnetic separation, compressor etc.	5
6.	Drawing/theory of basic instrumentation symbols for flow, such as suitable pipes, joint, pumps, valves, and temperature measurements using Auto CAD	4
7.	Drawing of basic instrumentation symbols for level, pressure and combined instruments using Auto CAD	3
8.	Drawing of miscellaneous instrumentation symbols using Auto CAD	3
9.	Design of a heat exchanger using Auto CAD	3
10.	Design of an absorber using Auto CAD	3
11.	Design of a distillation column using Auto CAD	3
12.	Design of evaporator/Design of condenser/Design of a chemical reactor	4
13.	Self Study (few selected topics)	--
Total		42

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class activities (Quiz-1/Assignments/Lab)	Week 2 till	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
		Week 11	
2.	Oral discussion/Homework and participation in classroom/BB/Assignment/	All weeks	10%
3.	Midterm	Week 6	20%
.4	Quiz-2/ Self study	--	10%
5.	Final Term Exam	As scheduled	50%
6.	***Total***		**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Classroom/Drawing Lab policy • Below link (my personal website) contains required course materials. • Soft and hard copies of lecture notes and some sections of the following books: 1. Brownell L.E, Process Equipment Design - Vessel Design, Wiley Eastern Ltd., 1986. 2. Bhattacharya B.C., Introduction to Chemical Equipment Design - Mechanical Aspects, CBS Publishers and Distributors, 2003. • Towler, G. P. and R. K. Sinnott, Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design, 2nd Edition, Butterworth Heinemann, 2012.
Supportive References	• "Fundamentals of Engineering Thermodynamics" by Michael J Moren & Howard N Shapiro, *John Wiley & Sons Inc. England,* (2006).
Electronic Materials	3. Donald Kern, Process Heat Transfer, 1st Edition, Tata McGraw-Hill Education, 1950. 4. Robert E. Treybal, Mass-Transfer Operations, 3rd Edition, McGraw-Hill Book Company, 1981. 5. Learn About Auto CAD: An Introduction to AutoCAD for Beginners, by Auto Desk. • https://sites.google.com/site/santhirajupilli/lecture-notes_jazan-university/chet-116-proc-equp-design-drawing (url for most of my classroom lecture notes)
Other Learning Materials	• Virtual lab Videos/LAB demos

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom equipped with projector and whiteboard and enough seating arrangements. • Laboratory with required software and computers with a lab instructor. • Appropriate Seating arrangements
Technology equipment (projector, smart board, software)	• Smart Board • Laboratory with required software and computers • Internet connectivity

Items	Resources
	• Speakers (for audio)
Other equipment (depending on the nature of the specialty)	• Whiteboard of good quality (to be used as a screen for playing videos as well) • Whiteboard markers • Paper for photocopying • Photocopying and printing facilities for the teachers and the students

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Quality Assurance and Accreditation Unit/Faculty	Quizzes, Assignments, exams **Direct**
Effectiveness of students assessment	CRC / QAU / HoD	Direct/ Indirect
Quality of learning resources	Track leaders / CRC	Indirect
The extent to which CLOs have been achieved	HoD / committee nominated by HoD	Random re-checking of evaluated answer sheets Surveys designed by the CHET dept. faculty/ University - distributed among the course instructors. **Direct/ Indirect**
Other	Course Instrcutor / QAU	CLO assessment template that is further verified at course coordinator and QAU level.

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	*Chemical Engineering Technology*
REFERENCE NO.	CAITCET24012

DATE	17/04/2024