T-104
2022

Course Specification

Course Title:	**MOMENTUM TRANSFER**
Course Code:	**114 CHET**
Program:	**Chemical Engineering Technology**
Department:	**Chemical Engineering Technology**
College:	**CAIT**
Institution:	**JAZAN UNIVERSITY**
Version:	**V2022**
Last Revision Date:	**01 Mar 2024**

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A. General information about the course:

Course Identification					
1. Credit hours:					
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ■	Elective☐			
3. Level/year at which this course is offered:3					

4. Course general Description

The flow and behavior of fluid are important in many of the unit operations in process engineer. A fluid may be defined as a substance that does not permanently resist distortion and hence will be changing its shape. In this course gases, liquid and vapor are considered to have the characteristics of fluid and to obey many of the same laws. In the process industries, many of the materials are in fluid form and must be stored, handled, pumped and processed, so it is necessary that we become familiar with the principles that govern the flow of fluid and the equipment used. Typical fluids encountered include water, air, CO_2, Oil, slurries and thick syrup.

The course is introduced through two classes weekly. They are: 1 class (1 hour) for the theoretical part and 2 class (2 hour) for the lab for which students apply the concepts of the lectures.

5. Pre-requirements for this course (if any):

General Chemistry

6. Co- requirements for this course (if any):

7. Course Main Objective(s)

Momentum transfer is a branch of the Transport phenomena. This course is designed to teach students the importance of Momentum Transfer and their applications from the viewpoint of chemical engineering. This course include studying the Principles of momentum transfer and overall balance: Introduction- fluid statics- general molecular transport equation – viscosity of fluid- types of flow and Reynolds number, over all mass balance and continuity equation- Principles of momentum transfer and applications : Flow past immersed objects and packed and fluidized beds- measurement of flow of fluids- pumps and gas moving equipment- agitation and mixing of fluid and power requirements- non- Newtonian fluids –dimensional analysis in momentum transfer.

1. Teaching mode (**mark all that apply**)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	32	100
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0

No	Mode of Instruction	Contact Hours	Percentage
4.	Distance learning	0	0

2. Contact Hours **(based on the academic semester)**

No	Activity	Contact Hours
1.	Lectures	14
2.	Laboratory/Studio	28
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	NA
	Total	32

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	Explain the meaning and the definitions of different fluid properties such as pressure, density, temperature, viscosity and velocity fields.	K1.3	Lecture, tutorial, active learning	Quizzes, Assignments, exams, and SSR
1.2				
…				
2.0	Skills			
2.1	Explain the laws related to fluid properties including Newton's laws of viscosity-rate of a transfer process.	S1.2	Lecture, tutorial, active learning	Quizzes, Assignments, exams, and SSR
2.2	Choose the suitable pipes, joint, pumps, valves and instrument used and characteristics of pumps in chemical process industries.	S2.1	Lecture, tutorial, active learning	Quizzes, Assignments, exams
2.3	Apply manometery for measurements of pressure.	S4.3	Lecture, tutorial, active learning	Quizzes, Assignments, exams
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate practical utility of theoretical concept in momentum transfer and different industrial applications to work independently and	V1.1	Assignments	Marks are given according to participating in classroom

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	meet deadlines.			
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the course- Review the unit and dimension- Principles of momentum transfer and overall balances	5
2.	Fluid statics, general molecular transport equation for momentum, heat, and mass transfer	4
3.	Viscosity of fluids, Type of fluid flow and Reynolds number- Overall mass balance - Overall momentum balance and continuity equation	5
4.	Review of quiz# 1 and Midterm exam	2
5.	Principles of momentum transfer and applications, flow past immersed objects and packed and fluidized beds, types and functions of valves such as gate valves, globe valves, ball valves, butterfly valves, check valves (swing & ball), parts of a valve and flanges.	5
6.	Measurement of flow of fluid: Orifice meter, Venturi meter, Pitot tube, Rotameter, pumps and gas moving equipment, positive displacement pumps, rotary and reciprocating pumps. Centrifugal pumps and characteristics, functions and types of compressor, blowers, advantageous and disadvantageous.	5
7.	Review of quiz# 2/Assignment	1
8.	Agitation and mixing of fluids and power require - dimensional analysis in momentum transfer	3
9.	Reviewing of full semester and final term exam/ **Practice**	2
10	Selected Topics	SSR
Total		32

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Week 3 till Week 12	10%
2.	Class Activity	Week 1 till Week 12	10%
3.	Laboratory	All weeks	10%
4.	Midterm	Week 7	20%
5.	SSR/Presentation	Last week	10%
6.	Final Term Exam	As scheduled	40%

*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	Lecture notes (PPT) and hardcopies of some sections from "*Textbooks* 1-Soft and hard copies of lecture notes and some of sections from Warren L. McCabe, Julian C. Smith and Peter Harriott, Unit Operations Of Chemical Engineering, 5th Ed. ISBN 0-07-112738-0. 2- Introduction To Chemical Engineering Paperback – 1 July 2017 by Salil Ghosal, Shyamal Sanyal, Siddhartha Datta. 3- S. Pushpavanam, **Introduction to Chemical Engineering, 2nd edition**, Wiley 2012".
Supportive References	
Electronic Materials	• Transport processes and Unit Operations, second edition, Prentice hall international, inc., by Christil J Geankolpis. ISBN 0-13-045253- • Warren L. McCabe, Julian C. Smith and Peter Harriott, Unit Operations Of Chemical Engineering, 5th Ed. ISBN 0-07-112738-0. • https://sites.google.com/site/santhirajupilli/lecture-notes_jazan-university/chet-121-momentum-transfer (url for most of my classroom lecture notes)https://nptel.ac.in/courses
Other Learning Materials	• Not utilized

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and Laboratory
Technology equipment (projector, smart board, software)	Computer and projector
Other equipment (depending on the nature of the specialty)	Not utilized

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Institution	Online Direct Survey

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of students assessment	Course Coordinator	Indirect
Quality of learning resources	Course Coordinator	Indirect
The extent to which CLOs have been achieved	Course Coordinator	Excel Sheet-Direct
Other		

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