Seoul National University of
Science & Technology
232 Gongneung-ro,Nowon-gu,
Seoul 01811 Korea

MSDE Module Descriptor

Module Title Fluid Mechanics	**Module Code** MSDE 319	**Semester (Sem 1 / Sem 2)** Sem 1
Credits 10	**Level** 5	**Professor and email** Hyo-Sok Ahn hsahn@seoultech.ac.kr
Delivery Method Lecture	**Delivery Location** SeoulTech, Mugung Hall	

Module Synopsis

This module aims to provide the student with knowledge and understanding about relations of viscosity, velocity, density, pressure, force and momentum, and the basic concepts of static and dynamic behaviour of fluid flow. Students then learn basic equations such as Bernoulli, continuity, momentum, and energy equations and their applications. Students learn internal viscous flows and friction losses in a piping system The learning outcomes include abilities of identifying the problem and relevant parameters, applying appropriate equations to the problem, and planning and conducting the given project subject to technical, time, and commercial constraints. Assessment is through mid-term and final examinations and a group based term project related to a refinery piping system design.

Outline Syllabus

Introduction and basic concepts
Concept of fluid. No-slip condition. Viscous shear stress. Viscous and inviscid flow. Laminar and turbulent.

Properties of fluid
Density and specific gravity. Vapour pressure and cavitation. Viscosity. Speed of sound

Pressure and fluid statics
Pressure and measurement devices. Fluid statics. Hydraulic force on plane surface. Buoyancy and stability.

Mass, Bernoulli, and energy equations
Conservation of mass and energy. Static, dynamic, and stagnation pressures. Hydraulic grade line.

Momentum analysis and flow systems
Newton's law. Linear momentum equation. Force acting on control volume. Integral and differential forms

Internal Flow
Laminar and turbulent flows in pipe. Minor losses. Friction loss calculation by Moody's diagram.

External flow
Drag and Lift. Friction and pressure drag. Flow separation. Parallel flow over flat plates.

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Indicative Reading

1) Essentials of Fluid Mechanics: Fundamentals and Applications, John M. Cimbala and Yunus A. Cengel, McGraw-Hill, New York, 2008
2) Introduction to Fluid Mechanics, 7th Edition, Wiley, Robert W. Fox, Philip J Prichard, and Alan T. McDonald,2010

NOTIONAL STUDENT WORKLOAD	**Hours**
MODE OF DELIVERY (FT / PT / DL)	FT
Lectures	40
Seminars	
Tutorials	10
Laboratories/studios/practical	
Directed learning	20
Independent Learning	20
Work experience/fieldwork	
Other: eg formal presentation	10
Total Workload 100 hours for a 10 credit module 200 hours for a 20 credit module	100

Module Learning Outcomes	
KU1,2,3	KU1. Demonstrate basic knowledge of the scientific and mathematical foundations of engineering to solve basic problems. KU2. Perform simple analysis of familiar engineering systems. KU3. Identify and utilise basic methodologies to create solutions to specific engineering problems.
IPSA1,4	IPSA1. Demonstrate the use of fundamental approaches to solving readily defined engineering problems. IPSA4. Illustrate solutions to basic engineering problems.
PVA2	PVA2. Demonstrate creativity in discussing solutions to standard problems.

Assessments	Assessment Type	Weighting %	Mid-Term/interim/final
Coursework			
Project	Group project (with presentation)	30	
Quiz			
Test			
Laboratory			
Exam	1 hr 2 hrs exam	10 60	Mid-term Final
Presentation			