



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
College of Oil and Gas Techniques
Engineering-Kirkuk
Department of Fuel and Energy
Techniques Engineering



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Fluid Mechanics		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COGTEK200		
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	2	Semester of Delivery	
Administering Department	FEK	College	COGTEK
Module Leader	Obed Majeed Ali	e-mail	obedmajeed@ntu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p>1-Using the least teaching methods in line with the level of students and giving room for students to discuss. 2 - Using modern and advanced means to deliver the largest amount of knowledge to the student. 3 - Activating the role of educational counseling in the subject.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>At the end of the course, students are able to: 1. Explain basic concepts pertaining to fluid statics and dynamics. 2. Apply Bernoulli's equation. 3. Demonstrate standard pressure drop calculations for incompressible flow. 4. Explain working principles and features of basic piping accessories. 5. Employ basic design of fluid transfer system for incompressible flow.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Introduction Physical Properties of Fluids (Density, specific weight, viscosity, surface tension, and compressibility) Dimension Analysis(Dimensions, dimensional homogeneity, dimensionless analysis.) Fluid Statics(Pressure, pressure head, measurement of pressure, buoyancy, fluid masses subjected to acceleration , fluid at rotation) Fluids Flow(Continuity, energy, and momentum equations. Applications) Flow in Pipes (Newtonian and Incompressible Fluid) (Pressure drop in pipes for laminar and turbulent flows. Pressure drop in fittings, Time required to empty liquid tank, Velocity distribution in pipes for laminar and turbulent flows. Pressure drop in non-circular pipes) Flow Measuring Instruments(Pitot tubes, orifice meter, venture meter, and rotameter.)</p>



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Pumping Equipment(Power, efficiency, NPSH, Centrifugal pumps (performance , characteristics curves, pump relations, and pumps arrangement), Positive displacement pumps)
Flow Through Porous Media(Darcy law, porosity, specific surface, Kozeny equation, and Ergun equation.)
Particle Mechanics(Drag force; drag coefficient, flow through spherical bodies, terminal falling velocity, and Galileo number.)
Fluidization(Mechanism, minimum fluidization velocity, and pressure drop in fluidized bed.)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

The main strategy that will be adopted in introducing this unit is to encourage students to participate in exercises, while at the same time improving and expanding critical thinking skills especially since fluids are present in all industrial processes. This will be achieved through classes and interactive tutorials and by reflecting on the type of laboratory experiments that include activities on theoretical topics to be applied.



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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	93	Structured SWL (h/w)	7.5
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem)	107	Unstructured SWL (h/w)	5.5
الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	200		
الحمل الدراسي الكلي للطلاب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Physical Properties of Fluids



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	Density, specific weight, viscosity, surface tension, and compressibility Dimension Analysis Dimensions, dimensional homogeneity, dimensionless analysis.
Week 2	Fluid Statics Pressure, pressure head, measurement of pressure, buoyancy, fluid masses subjected to acceleration , fluid at rotation
Week 3	Fluids Flow Continuity, energy, and momentum equations. Applications
Week 4	Flow in Pipes (Newtonian and Incompressible Fluid) Pressure drop in pipes for laminar and turbulent flows. Pressure drop in fittings, Time required to empty liquid tank
Week 5	Flow in Pipes (Newtonian and Incompressible Fluid) Velocity distribution in pipes for laminar and turbulent flows. Pressure drop in non-circular pipes
Week 6	Flow Measuring Instruments Pitot tubes, orifice meter.
Week 7	Flow Measuring Instruments venture meter, and rotameter.
Week 8	Pumping Equipment Power, efficiency
Week 9	Pumping Equipment NPSH, Centrifugal pumps (performance , characteristics curves, pump relations, and pumps arrangement), Positive displacement pumps
Week 10	Flow Through Porous Media Darcy law, porosity, specific surface.
Week 11	Flow Through Porous Media Kozeny equation, and Ergun equation.



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Week 12	Particle Mechanics Drag force; drag coefficient, flow through spherical bodies.
Week 13	Particle Mechanics terminal falling velocity, and Galileo number.
Week 14	Fluidization Mechanism, minimum fluidization velocity.
Week 15	Fluidization pressure drop in fluidized bed.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: BOURDON GAUGE
Week 2	Lab 2: SPECIFIC GRAVITY
Week 3	Lab 3: VISCOSITY
Week 4	Lab 4: CENTER OF PRESSURE AND PLANE SURFACE
Week 5	Lab 5: RENOLDS NUMBER
Week 6	Lab 6: HEAD LOSES
Week 7	Lab 7: VENTURI
Week 8	Lab 8: ORIFICE
Week 9	Lab 9: BERNOULLI'S PRENCIPLE
Week 10	Lab 10: EFFECT OF SUDDEN
Week 11	Lab 11: IMPACT OF JET
Week 12	Lab 12: ROTAMETER
Week 13	Lab 13: EFFICIENCY OF PUMP



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Week 14	Lab 14: FALLING VELOCITY
Week 15	Lab 15: FLUIDIZATION

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Chemical Engineering, Volume 1, Sixth edition Fluid Flow, Heat Transfer and Mass Transfer J, M. Coulson and J. F. Richardson with J. R. Backhurst and J. H. Marker	Yes
Recommended Texts	Fluid Mechanics ,Fifth edition , Frank M. White <i>University of Rhode Island</i>	tes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required



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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.