Course Specifications

University: Benha University	**Faculty: High Institute of Technology**
Course specifications	
Programme(s) on which the course is given	B.Sc. mechanical Engineering
Major or minor element of programme	N.A.
Department offering the programme	Mechanical Engineering technology
Department offering the course	Mechanical Engineering technology
Academic year / Level	Second year, first semester.
Date of specification approval	16/4/2009

A- Basic Information

Title: Fluid Mechanics **Code:M201**

Credit Hours: N.A **Lecture: 4** **Tutorial: 2** **Total: 6**

Practical: 6 per term

B- Professional Information

1 - Overall aims of course

By the end of this course the students will be able to:

i) Demonstrate knowledge about all fluid properties and some practical applications.
ii) Demonstrate knowledge of fluid statics; estimation of forces on submerged bodies in static fluid situation.
iii) Transportation of different types of fluids in a variety of applications and be able to avoid unwanted phenomena such as cavitation.
iv) Define and solve problems in fluid dynamics in various engineering applications
v) Apply Bernoulli equation on various fluid problems.
vi) Estimation of forces on moving, or stationary bodies caused by flowing fluids, either internally or externally such as forces on nozzles, elbows, blades and drag forces on chimneys, high rise buildings, different types of constructions.
vii) Solve real fluid flow in pipes and open channel; apply steady flow energy equation on different fluid flow situations.
viii) Use similarity in fluid flow problems.
ix) Share ideas and work in a team in an efficient and effective manner under controlled supervision or independently.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1-Define fluid properties, stresses in fluids at rest and in motion and types of fluid flows.
a2-Derive the governing equations of fluid flow: continuity, energy and momentum equations from principles of mass, energy and momentum conservation.
a3-Define the terms of Bernoulli's equation, include major and minor losses and draw the energy and the hydraulic gradient lines for flow systems.

a4 -Describe and explain velocity and flow measuring devices, boundary layers separation, friction and form drag.
a5 –Solve the fluid flow in pipe network.
a6 –Solve the different types of viscous flow problems.
a7-Apply π theorem.

b. Intellectual skills

b.1 Analyze problems, conclude solutions and demonstrate creative thinking.

c- Professional and practical skills

c.1 Use appropriate fluid measurement lab equipment.

c.2 Design and perform experiments in the lab and field within proper technical, safety and ethical framework.

d- General and transferable skills

d.1 Write reports in accordance with the standard scientific guidelines.
d.2 Present reports, discuss results and defend his/her ideas.
d.3 Work coherently and successfully as a part of a team in assignments.

3- Contents

Topic	No. of Hours	Lecture	Tutorial/ Practical
Fundamental concepts: Definition of a fluid, Dimensions and units. Fluid Properties	**12**	**8**	**4**
Fluid Statics: Pressure and pressure measurements, Hydraulic forces on submerged surfaces. Rotating containers.	**12**	**8**	**4**
Basic Equations of Fluid Mechanics: kinematics of fluid flow.	**6**	**4**	**2**
Bernoulli's Eqs. And its applications	**12**	**8**	**4**
Control volume approach, continuity, momentum, and energy equations with their applications.	**12**	**8**	**4**
Real Viscous flow.	**6**	**4**	**2**
Flow in Closed Conduits: laminar and turbulent flows, equation of motion, primary and minor losses, hydraulic and energy gradient lines.	**6**	**4**	**2**
Flow Over Immersed Bodies: Boundary layer growth and separation , drag on flat plate.	**6**	**4**	**2**
Dimensional analysis and similarity	**6**	**4**	**2**
Lab.	**10**	**4**	**6**
Total	**88**	**56**	**32**

4– Teaching and learning methods

4.1- Lectures
4.2- Tutorials and discussion sessions
4.3- Laboratories

5- Student assessment methods

5.1 Written exams. : To assess the understanding of the scientific background
5.2 Oral : To assess the skills of analysis and discussion,
5.3 Class activities : (reports discussion and assignments):

Assessment schedule

First Assignment	Week 3
Second Assignment	Week 6
Mid-term exam.	Week 8
Third assignment	Week 11
Mid-term exam.	Week 13
Oral exam.	Week 14
Final exam.	Week 15

Weighting of assessments

Mid-term examinations	20%	
Final-term examination	60%	
Oral examination	5%	
Practical examination	5%	
Semester work	10%	
Total	100	%

6- List of references

6.1- Course notes

Fluid Mechanics (lecture notes)

6.2- Essential books (text books)

-Frank M. White, "Fluid Mechanics" Third Edition, McGraw Hill Inc.,1994.
- Streeter, V.L., Wylie, E, B., and Bedford, K. W., " Fluid Mechanics "Ninth Edition , McGraw Hill, N.Y.,1998.

6.3- Periodicals, Web sites, … etc

7- Facilities required for teaching and learning

7-1 Computers
7-2 Laboratories
7-3 Laboratory equipments
7-4 Teaching Aids(Presentation board, overhead projector, data show)

Course coordinator: **Dr. Mohamed Elsharnoby**

Head of Department: **Associate Prof. Sameh Nada**

Date: 16/4 /2009