Course Specifications

University: Benha University  Faculty: Benha Faculty of Engineering

Course specifications

Programme(s) on which the course is given: Civil Engineering
Major or minor element of programmes:
Department offering the programme: Civil Engineering
Department offering the course: Mechanical Engineering
Academic year / Level: 2008/2009
Date of specification approval:

A- Basic Information

Title: Fluid Mechanics and Machinery  Code: M 053
Credit Hours:
Lecture: 3
Tutorial: 1
Practical: 1
Total: 5

B- Professional Information

1 - Overall aims of course

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

✓ Demonstrate knowledge of incompressible fluid flows, fluid statics, kinematics of flows and essential basic hydrodynamics.
✓ Define and solve problems in fluid dynamics in civil engineering applications
✓ Predict necessary fluid parameters of full scale projects by performing simple model experiments.
✓ 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:

a.1 Define fluid properties, stresses in fluids at rest and in motion.
a.2 Understand hydrostatic forces on plane and curved surfaces and illustrate buoyancy conditions.

a.3 Derive the governing equations of fluid flow: continuity, energy and momentum equations from principles of mass, energy and momentum conservation.

a.4 Define the terms of Bernoulli's equation, include major and minor losses and draw the energy and the hydraulic gradient lines for flow systems.

a.5 Describe and explain velocity and flow measuring devices, boundary layers.

a.6 Understand the performance of pumps.

a.7 Understand the phenomena of cavitation.

b. Intellectual skills

b.1 Solve basic problems for static fluid mechanics.

b.2 Specify the difference between compressible and incompressible fluids.

b.3 Analyze fluid dynamics problems for the incompressible fluids.

b.4 Analyze a pumping system.

b.5 Select pumps based on the data of the pumping system.

b.6 Conclude the parameters affecting pump cavitation.

c. Professional and practical skills

c.1 Use appropriate fluid measurement lab equipment.

C.2 Design and perform experiments in the lab in a proper way.

C.3 Obtain experimental data on fluid dynamics.

C.4 Investigate pump performance.

d. General and transferable skills

d.1 Write lab reports in accordance with the scientific guidelines.

d.2 Present data on a scientific way.

D.3 Discuss results and obtain conclusions.

D.4 Work successfully as a part of a team.
3- Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of Hours</th>
<th>Lecture</th>
<th>Tutorial/ Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental concepts: Definition of a fluid, Dimensions and units. Fluid Properties</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Fluid Statics: Pressure at a point, equation for pressure field, pressure measurements, manometers, Hydrostatic force on submerged surfaces, Buoyancy</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basic fluid dynamics, definition of fluid dynamics, kinematics of flow, control volume approach, continuity, momentum, energy equations, Bernoulli’s Equation, flow measurement.</td>
<td>9</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Dimensional analysis and similarities, dimensional homogeneity. Buckingham theorem</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Flow in closed conduits: laminar and turbulent flows, entrance region and fully developed flow, pressure drop in pipes, minor losses, hydraulic and energy gradient lines.</td>
<td>6</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Open channel flow, characteristics, uniform depth channel flow.</td>
<td>6</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Hydraulic pumps and turbines, classifications, centrifugal pumps, axial flow pumps, pump selection</td>
<td>6</td>
<td>2</td>
<td>2</td>
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</tbody>
</table>

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 concepts and the ability to solve problems

5.2 Oral exam  to assess the skills of analysis and discussion,

5.3 Class work  to assess the discussion of the technical reports assignments
Assessment schedule

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Week</th>
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<tbody>
<tr>
<td>Assessment 1</td>
<td>Week 7</td>
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<tr>
<td>Assessment 2</td>
<td>Week 12</td>
</tr>
<tr>
<td>Assessment 3 (oral)</td>
<td>Week 15</td>
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<tr>
<td>Assessment 4 (Final exam)</td>
<td>Week 16</td>
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</tbody>
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Weighting of assessments

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Mid-term examinations</td>
<td>20 %</td>
</tr>
<tr>
<td>Final-term examination</td>
<td>60 %</td>
</tr>
<tr>
<td>Oral examination</td>
<td>10 %</td>
</tr>
<tr>
<td>Practical examination</td>
<td>%</td>
</tr>
<tr>
<td>Semester work</td>
<td>10 %</td>
</tr>
<tr>
<td>Other types of assessment</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Any formative only assessments

6- List of references

6.1- Course notes
   Lecture notes

6.2- Essential books (text books)

6.3- Recommended books

6.4- Periodicals, Web sites, … etc

7- Facilities required for teaching and learning

Teaching facilities (whiteboard, presentation board, data show)
Laboratory

Course coordinator: Dr. Hesham Mohamed El-Batsh

Head of Department:
Date: //