



Course specification

University/Academy: Damanhour University

Faculty/Institute: Science

Department: Mathematics

1. course Data:

Course code: Math423	Course title: Dynamics of fluids	Academic year/level: 2010-2011 Forth year - First term
Specialization: Mathematics and Physics	No. of instructional units: lecture <input type="text" value="3"/> tutorial <input type="text" value="2"/> practical <input type="text" value="-"/>	

2. course Aim

The aim of the course is to know and applies the fundamentals of dynamic of fluid. Students should be able to use kinematics of fluid elsewhere when appropriate. Understand frames of references, acceleration vector and vorticity vector. Apply 3-dimensional vector calculus to dynamics of fluid. Calculate kinetic energy for irrotational motion. Understand pressure in ideal fluid. The student should have both a conceptual and a quantitative understanding of the description of the topics listed above.

3. Intended learning outcome

a) Knowledge and understanding

- A1. State the velocity potential, Laplace's equation, uniqueness theorem and kinetic energy.
- A2. Describe stream line and path line of the particle of the fluid
- A3. Mention the forces in fluids and surface forces.



	<p>A4. define Euler's momentum equation.</p> <p>A5. Illustrate integration of the momentum equation.</p> <p>A6. Describe Boundary-value problems.</p> <p>A7. Summarize constancy of circulation: Kelvin's theorem.</p> <p>A8. Recognize persistence of irrotational motion.</p> <p>A9. Identify the basic principles of impulsive motion.</p> <p>A10. Identify the basic principles of Stream function and its properties.</p>
b) Intellectual skills	<p>B1. Analysis of uniform stream past a circular cylinder, understanding of the relationship between circular cylinder and circular cylinder with circulation (application, knowledge, analysis, comprehension).</p> <p>B2. Formulate the basic laws of vortices.</p> <p>B3. Describe the rectilinear vortex (knowledge, comprehension, synthesis).</p> <p>B4. Construct the relationship between source and equal sink-doublets and source and an equal sink in a uniform stream.</p> <p>B5. Create an application for standard flow.</p> <p>B6. Determine mathematical representation of wave motion</p>
c) Professional skills	<p>C1. Write theory of small disturbance and Blasius theorem</p> <p>C2. Use equation of motion in terms of stress.</p> <p>C3. Use cylindrical and spherical coordinates for solving problems.</p>
d) General skills	<p>D1. Communicate with the others for working in groups to solve problems.</p> <p>D2. Apply fundamental concepts for solving some problems in stationary waves on deep water</p>



	<p>d3. Solve simple problems relating to sound waves, wave in gas and intensity of sound.</p> <p>D4. Perform vibration in tubes.</p>
4. course content	<p>Viscus fluid, ideal fluid and compressible and incompressible fluid</p> <p>Stream lines and paths of the particles, stream tubes and acceleration vector</p> <p>Equation of continuity and motion of fluid element</p> <p>The velocity potential, irrotational motion, Laplace equation and uniqueness theorem.</p> <p>Kinetic energy, axis symmetrical motion, two dimensional motions.</p> <p>Forces in fluid, Kelvin theorem, Lagrange theorem and impulsive motion</p> <p>Stream function, velocity potential, Blasius theorem and vortex</p>
5. Teaching and learning methods	<p>5.1 Lectures.</p> <p>5.2 Tutorials</p> <p>5.3 Homework</p> <p>5.4 Oral discussion</p>
6. teaching and learning methods for students with special needs	None
7. Student Assessment	
a) Procedures used:	Final exam



b) Schedule:	Assessment 1 Final exam Week 15
c) Weighing of Assessment:	Final exam 150 Marks (100%)
List of Textbooks and References:	
d) Course Notes	Course notes provided by the staff member of Math department, to be handed at the beginning of the semester.
e) Required Books (Textbooks)	L.M.Milne-Thomson,C.B.E. Theoretical Hydrodynamics, London ,Macmillan, 1960 N.Curle and H.J.Davies Modern Fluid Dynamics, London,D.Van Nostrand Comp.Ltd 1968
f) Recommended Books	None
g) Periodicals, web sites,...,etc	None

Course Instructor: Dr. Ragab Omer Abd El-Rahman

Head of Department: Dr. Ragab Omar Abd El-Rahman

Date: / /