ENG ME 542 Advanced Fluid Mechanics

2008-2009 Catalog Data:

ENG ME 542 Advanced Fluid Mechanics Prereq: ENG ME 422. Incompressible fluid flow. Review of control-volume approach to fluids engineering problems, with advanced applications. Differential analysis of fluid motion. Derivation of full Navier-Stokes, Euler, and Bernoulli equations. Unsteady Bernoulli equation. Velocity potential and its application to steady 2D flows. Vorticity and vortex motion. Eulerian vs. Lagrangian analysis. 4 cr.

Class/Lab Schedule: Two 2 hour lectures per week

Status in the Curriculum: Elective

Textbook(s) and/or Other Required Material: Howe, M. S.: "Hydrodynamics and Sound", CUP

Coordinator: Michael Howe, Professor, Mechanical Engineering

Prerequisites by topic:
1. Knowledge of introductory fluid mechanics

Goals:
This course is intended to consolidate your knowledge of fluid mechanics and to develop a critical and mature approach to the subject. It will supply the background preparation for more specialized courses on fluid mechanics, acoustics and aeroacoustics.

Course Learning Outcomes:
As an outcome of completing this course, students will:

i. Consolidate his/her knowledge of fluid mechanics and to develop a critical and mature approach to the subject.
ii. He/she will obtain the background preparation for more specialized courses on fluid mechanics, acoustics and aeroacoustics.

Course Learning Outcomes mapped to Program Outcomes:

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	i,ii	-	-	-	i,ii	-	-	-	-	-	ii			
Emphasis:	5	1	1	1	3	1	1	1	1	1	2	1	1	1

Topics (time spent in weeks):

1. Equations of motion (3)
2. Potential flow theory (4)
3. Ideal flow in 2 dimensions (3)
4. Rotational incompressible flow (4)

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%

Status of Continuous Improvement Review of this Course:
Prepared by: M. S. Howe **Date**: 23 March 2009