EASTERN MEDITERRANEAN UNIVERSITY
COURSE LEARNING OUTCOMES

COURSE CODE	MENG555	**COURSE LEVEL**	*Graduate*
COURSE TITLE	Computational Fluid Dynamics	**COURSE TYPE**	*Elective*
CREDIT VALUE	**(3**, 0**) 3**	**ECTS VALUE**	To be determined later
PREREQUISITES	None	**COREQUISITES**	
DURATION OF COURSE	*15* weeks		

AIMS

This course is an introduction to computational fluid dynamics. The course is aimed

1) To give a basic understanding to the discretisation of equations of mass, momentum and energy.
2) To write simple CFD codes for some benchmark one- and two-dimensional flow problems on Cartesian grids.
3) To learn the process of creating and exploring a mesh by using any available mesh-generation software packages.
4) To learn how to set suitable boundary conditions and numerical models using any available CFD software packages.
5) To explore the post-processing facilities of the CFD code to explore the results.
6) To assess the computational results against the published experimental and numerical data.

RELATIONSHIP WITH OTHER COURSES

Students are expected to be proficient in applying mathematics, elementary vector and matrix algebra and basic numerical methods. Furthermore, a knowledge of the conservation laws for mass, momentum and energy and an awareness of their application to fluid flow problems are required.

TEXTBOOK(S)

H.K. Versteeg and W. Malalasekera, *An Introduction to Computational Fluid Dynamics: The Finite Volume Method*, Pearson, Prentice Hall, 2nd edition, 2007.
J. Tu, G-H. Yeoh, C. Liu, *Computational Fluid Dynamics, A practical Approach*, Butterworth-Heinemann, 2nd edition, 2013.

LEARNING OUTCOMES

On successful completion of the course the students should be able to:

- develope an understanding of computational fluid dynamics (CFD), problem solving with CFD and the working principles of a CFD package;
- understand and use the finite volume method for one, two and three-dimensional steady state diffusion problems;
- apply the TDMA method for the solution of one, two and three-dimensional problems;
- understand the central difference, upwind, hybrid, power law, QUICK and other higher order schemes to convection-diffusion problems
- undestand the stability problems of the convection schemes and the application of TVD schemes;
- understand the solution algorithms for pressure-velocity coupling
- write simple computer codes for 1- or 2- dimensional flows on cartesian grids;
- understand and apply the solution methods of unsteady flow problems using explicit, implicit and Crank-Nicholson schemes.
- understand solution algorithms on complex geometries.
- apply turbulence modeling to fluid flow problems.
- understand transition from laminar to turbulent flow, effect of turbulence on time averaged Navier-Stokes equations.
- understand and apply mixing length model, the k-e model, Reynolds stress equation model and algebraic stress equation models.

Approved by the Department Board of ____ Department

Decision Date: _______________ Decision No.: ____________