Computational Fluid Dynamics (MSM4464)

Course Code	MSM4464								
Course Name	Computational Fluid Dynamics								
Credit Hour	4								
Prerequisite Course	Computational Methods in Industry (MSM4413)								
Contact Hours	Lecture:		3	units	(3 hour(s) per week)				
	Tutorial:		0	unit	(0 hour(s) per week)				
	Laboratory:		2	units	(2 hour(s) per week)				
Rationale for the Inclusion	Computational fluid dynamics (CFD) is frequently used in design, analysis and optimization of dynamical systems. It is also used to minimize the number of required physical experiments and in cases where physical experiments would be impractical. The purpose of this course is to provide students with a good understanding of the fundamentals used in fluid dynamics and introduce the appropriate methods in finding the solutions for industrial problem.								
Course Objective	The objective of this course is to give understanding for the major theories, approaches and methodologies used in CFD. Besides that, this course will build up the skills in the actual implementation of CFD methods which is concentrating to the Navier-stokes's equations and introducing appropriate method in finding the solutions.								
Course Synopsis	This course exposes the techniques for obtaining solution of fluid flow problems numerically. The topics include the development, philosophy and significance of Computational Fluid Dynamics (CFD). The governing equations of fluid dynamics are derived from the fundamental physical principles. This course will concentrate on solving Navier-Stokes equations using appropriate numerical scheme. The study on real industry applications such as fluid flow experimentation in oil and gas industry will be carried out and the solution will be attained using MATLAB software.								
Program Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
	/	/	/					/	
Soft Skills	**Code**		**CTPS**	**CS**	**TS**	**LL**	**ES**	**EM**	**LS**
	KIM		4					3	
Course Outcomes	By the end of semester, students should be able to:								
	CO1	Formulate appropriate numerical methods for solving related problem in Computational Fluid Dynamics							
	CO2	Provide the recommendations or conclusions for the selected fluid flow problems that based on the numerical solutions obtained by using numerical methods.							
	CO3	Adapt mathematical software to solve various fluid flow problems.							
	CO4	Practise ethical and professionalisme in technical report writing and presentation.							
Assessment	**Methods**		**Weighting**		**CO1**	**CO2**	**CO3**	**C04**	

Methods	Assignment/Projet	30%	/	/	/	/	
	Test	30%	/	/			
	Final Examination	40%	/	/			
	Total	**100%**					

Learning References	1	Hoffmann K.A & Chiang S.T (2000). Computational Fluid Dynamics: Volume 1. Engineering Education System, USA (Latest version - Main Reference)
	2	Ferziger J.H & Peric M (2002). Computational Methods for Fluid Dynamics (3rd Edition). Berlin, Springer (Latest version).
	3	Fletcher C.A.J (1991). Computational Technique For Fluid Dynamics 1. Springer-Verlag, New York (Latest version).
	4	Abdulnaser S (2009). Computational Fluid Dynamics. Ventus Publishing ApS (Latest version).
	5	Cebeci T & Cousteix (2005). Modelling and Computatioj of Boundary Layer Flows. Horizons Publishing, Long Beach, California, USA (Latest version).