MECH 4620

COMPUTATIONAL FLUID DYNAMICS

Staff Contact Details

Contact details and consultation times for course convenor

Dr Victoria Timchenko
Room 401C, J17
Tel: (02) 9385 4148
Fax: (02) 9663 1222
E-mail: v.timchenko@unsw.edu.au

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Associate Professor Guan Heng Yeoh
Room 401B, J17
Tel: (02) 9385 4099
Fax: (02) 9663 1222
E-mail: g.yeoh@unsw.edu.au

2. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves 3 hours per week (h/w) of face-to-face contact.

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3. Teaching strategies

Lectures in the course are designed to cover the terminology and core concepts and theories in CFD. They do not simply reiterate the texts, but build on the lecture topics using examples taken directly from industry to show how the theory is applied in practice and the details of when, where and how it should be applied.

Lab sessions are designed to provide you with feedback and discussion on the assignments, and to investigate problem areas in greater depth to ensure that you understand the application and can avoid making the same mistake again.

4. Course schedule

Week	***Lecturer***	***Topic***	***Work during laboratory session***	***DUE (Friday)***
1	VT	Introduction to CFD and ANSYS CFX	Backward facing step exercise Problem setup	-
2	GHY	Defining a CFD problem Creating and/or Importing Geometry in Design Modeler	Lab sessions on creating geometry and meshing	-
3	VT			

			work	
7	GHY	Turbulence: applications of models	Major assignment work, T2 work	T2: turbulence
8	VT	Computational methods ± discretisation	Major assignment work, T3 work	Initial assignment for literature review and mesh
9	VT	Solution Procedures	Major assignment work, T3 work	T3: Computational methods
10	VT	Post Processing ± analysis of results. Validation and Verification	Major assignment work	-
11	GHY	Multiphase modelling and combustion	Major assignment work	-
12	VT, GHY	Revision	Major assignment work	Assignment due

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also contain a structured marking criteria: you will write and abstract/executive summary, and you will be required to conduct a short review of some similar CFD you are able to find in relevant journal papers. Following this, you will write a discussion of your chosen numerical method and assumptions, and then sections relating to mesh convergence, turbulence modelling, and presentation of key results ±these reflect the topics which will be covered in depth in the lectures and labs and comprise the typical structure of a research report.

Assessment task	**Length**	**Weight**	**Learning outcomes assessed**	**Assessment criteria**	**Due date, time, and submission requirements**	**Marks returned**
Tutorial style problems	2 weeks	15%	1 and 4	Understanding		

6. Expected Resources for students

Suggested textbooks (either):

1. J.Y. Tu, G.H. Yeoh, and C. Liu, Computational Fluid Dynamics: A Practical Approach, 2nd Edition, 2012.
2. H.K. Versteeg and W. Malalasekera, An introduction to Computational Fluid Dynamics. The Finite Volume Method, 2nd Edition

Other references:

1. J.D. Anderson, Computational Fluid Dynamics.
2. P.J. Roache, Fundamentals of Computational Fluid Dynamics.
3. P.J. Roache, Verification and Validation in Computational Science and Engineering.
4. J.C. Tannehill, D.A. Anderson and R.H. Pletcher, Computational Fluid Mechanics and Heat Transfer.
5. S.V. Patankar, Numerical Heat Transfer and Fluid Flow.
6. D.C. Wilcox, Turbulence modelling for CFD.

All of the above textbooks can be found in the UNSW Library website:

9. Administrative Matters

All students are expected to read and be familiar with School guidelines and polices, available on the intranet. In particular, students should be familiar with the following:

Attendance, Participation and Class Etiquette
UNSW Email Address
Computing Facilities
Assessment Matters (including guidelines for assignments, exams and special consideration)
Academic Honesty and Plagiarism
Student Equity and Disabilities Unit
Health and Safety
Student Support Services

V Timchenko and GH Yeoh
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Appendix A: Engineers Australia (EA) Professional Engineer Graduate Attributes

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	