Jordan University of Science and Technology

Faculty of Engineering

Aeronautical Engineering Department

AE545 Computational Fluid Dynamics - JNQF Level: 7

First Semester 2023-2024

Course Catalog
3 Credit Hours. Introduction to computational fluid dynamics as well as numerical methods for predicting heat transfer using the finite-volume method. The course focuses on the incompressible flow of a viscous fluid, including internal flow, external flow, and steady flow past the cylinder. Application of a commercial CFD solver to a problem of interest.

Text Book	
Title	An Introduction to Computational Fluid Dynamics: The finite volume method
Author(s)	Versteeg, H. K. and Malalasekkera, W.
Edition	1st Edition
Short Name	Textbook
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#2	Computational Fluid Dynamics	2. Anderson, John D.	1st Edition	
Ref#3	Computational Fluid Mechanics and Heat Transfer	3. Dale A. Anderson, John Tannehill and Richard Pletcher	2nd Edition	
Ref#4	Numerical heat transfer and fluid flow	4. Suhas Patankar	1st Edition	
Ref#5	Computational Fluid Dynamics, A Practical Approach	J. Tu, G.H. Yeoh, and C. Liu	1st Edition	

Instructor	
Name	**Dr. MUATH BANI HANI**
Office Location	-

Office Hours	Sun : 10:30 - 11:30 Mon : 09:30 - 11:30 Tue : 10:30 - 11:30 Wed : 09:30 - 10:30 Thu : 10:30 - 11:30
Email	mabanihani@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 11:30 - 12:30 Room: LAB

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
714520	AE452 Heat Transfer	Prerequisite / Study
714430	AE443 Gas Dynamics	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	1 Introduction	From **Textbook**
Week 2	Navier Stokes Equations	From **Textbook**
Week 3	Introduction to finite difference and finite volume method	From **Textbook**, From **Ref#2**
Week 4	Numerical methods for predicting heat transfer using the finite-volume method	From **Textbook**, From **Ref#3**, From **Ref#4**
Weeks 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Introduction to commercial CFD software ANYSYS FLUENT	From **Ref#5**

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Develop and apply finite-volume method for solving fluid dynamics problems and heat transfer in engineering applications. [100SO1] [100L7K1]	20%	
Simulate incompressible flows of viscous fluids including internal flows, external flows, and steady flow past a cylinder using computational fluid dynamics techniques by applying a commercial CFD solver. [100SO6] [100L7S3]	80%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
20					80	

Relationship to NQF Outcomes (Out of 100%)	
L7K1	L7S3
20	80

Evaluation	
Assessment Tool	**Weight**
first exam	30%
second exam	30%
final exam	40%

Policy	
Atendance	The student is required to attend all the registered courses. The instructor shall register student attendance or absence electronically. JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 20% of the classes. If you miss a class, it is your responsibility to find out about any announcements or assignments you may have missed
Exam/Homework	Makeup exam should not be given unless there is a valid excuse according to JUST policies. Arrangements to take an exam at a time other than the one scheduled MUST be made prior to the scheduled exam time. Cheating or copying from neighbor on exam, quiz, or homework is an illegal and unethical activity. Standard JUST policy will be applied. All assignments must be your own work (your own words) Students are responsible for all information provided in lecture. Information presented in class supersedes any information posted elsewhere

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