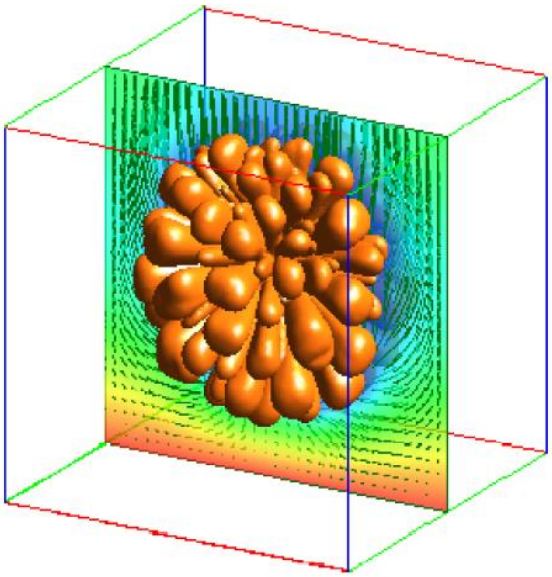
ME593: Advanced Computational Fluid Dynamics
Fall 2014: Practical Matters



Instructor:

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Course organization:

2 lectures per week: Tues. 2:00-3:15, Thurs. 2:00-3:15
1 homework set per two-weeks (due as listed)
4 projects per semester

Course Schedule:	Monday	Tuesday	Wednesday	Thursday	Friday
9:0-10:0					
10:00-11:00					
11:00-12:00					
12:00-13:00		Office Hours		Office Hours	
13:00-14:00					
14:00-3:15		Lecture B143		Lecture B143	
17:00-18:00	Office Hours		Office Hours		Office Hours
16:00-17:00					
16:30-18:05					

Course grade:

4 projects	40%
7 homework sets	20%
2 exams	40% (20% each)
Total	100%

Grading Policy:

90% and up: **A**
80%-89%: **B**
70%-79%: **C**
60%-69%: **D**

Note: Emergency Procedures. Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website www.dps.siu.edu (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

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TENTATIVE LECTURE OUTLINE – Fall, 2014

Date	Lecture Topic	Assignment
Week 1:		
Aug. 19 (T.)	Introduction, what is CFD, examples, computers, course administration	
Aug. 21 (R.)	Elementary numerical analysis: numerical integration-1	
Week 2:		
Aug. 26 (T.)	Elementary numerical analysis: finite difference approximation of derivatives	HW 1 assigned Project 1 assigned
Aug. 28 (R.)	Elementary numerical analysis: numerical solution of partial differential equations-1	
Week 3:		
Sep. 2 (T.)	Elementary numerical analysis: numerical solution of partial differential equations-2 Elementary numerical analysis: numerical solution of partial differential equations-3	
Sep. 4 (R.)	Elementary numerical analysis: finite volume Approximations	
Week 4:		
Sep. 9 (T.)	Review of fluid mechanics: the governing equations-1 Review of fluid mechanics: the governing equations-2	HW 2 assigned HW 1 due
Sep. 11 (R.)	Solving the Navier-Stokes equations using streamfunction and vorticity-1	Project 2 assigned Project 1 due
Week 5:		
Sep. 16 (T.)	Solving the Navier-Stokes equations using streamfunction and vorticity-2 Solving the Navier-Stokes equations using streamfunction and vorticity-3	
Sep. 18 (R.)	Theory of partial differential equations-1	
Week 6:		
Sep. 23 (T.)	Theory of partial differential equations-2	HW 3 assigned HW 2 due
Sep. 25 (R.)	Numerical methods for elliptic equations-1	
Week 7:		
Sep. 30 (T.)	Numerical methods for elliptic equations-2	
Oct. 2 (R.)	Numerical methods for elliptic equations-3	
Week 8:		
Oct. 7 (T.)	Numerical methods for parabolic equations-1	HW 4 assigned HW 3 due
Oct. 9 (R.)	Numerical methods for parabolic equations-2	
Week 9:		

Oct. 14 (T.)	**Fall break (no class)**	
Oct. 16 (R.)	Numerical methods for parabolic equations-3	Project 3 assigned Project 2 due
Week 10:		
Oct. 21 (T.)	**In-class exam**	HW 5 assigned HW 4 due
Oct. 23 (R.)	Numerical methods for hyperbolic equations-1	
Week 11:		
Oct. 28 (T.)	Numerical methods for hyperbolic equations-2	Project 4 assigned Project 3 due
Oct. 30 (R.)	Numerical methods for hyperbolic equations-3	
Week 12:		
Nov. 4 (T.)	Numerical methods for hyperbolic equations-4	HW 6 assigned HW 5 due
Nov. 6 (R.)	The advection-diffusion equation-1	
Week 13:		
Nov. 11 (T.)	**Veterans Day (No Class)**	
Nov. 13 (R.)	The advection-diffusion equation-2	HW 7 assigned HW 6 due
Week 14:		
Nov. 18 (T.)	The advection-diffusion equation-3	
Nov. 20 (R.)	Solving the Navier-Stokes equations using primitive variables-1	
Week 15:		
Nov. 25 (T.)	Solving the Navier-Stokes equations using primitive variables-2	
Nov. 27 (R.)	**Thanksgiving Break (No Class)**	
Week 16:		
Dec. 2 (T.)	Solving the Navier-Stokes equations using primitive variables-3	HW 7 due Project 4 due
Dec. 4 (R.)	Review and catch up	

Final Exam: Tuesday, Dec. 9, 2:00-4:00 p.m. in our classroom

ME593; Advanced Computational Fluid Dynamics Fall 2014; Course Objectives

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1) Gaining **factual knowledge** about the basic principles of Computational Fluid Dynamics (CFD).

2) **Learning to apply course material** to solve basic problems in engineering heat transfer and fluid flow numerically.

3) **Learning to apply course material** to *properly* use the commercial CFD software packages to solve heat transfer and fluid flow problems.