EGM6813 Fluid Mechanics II - Spring 2020

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Class Time: Tuesday 5th & 6th Periods (11:45am – 1:40am)
Thursday 5th & 6th Periods (11:45am – 1:40am)

Class Location: CSE E107 (*)

(*) Tentatively Thursday 5th period will be in a different nearby-room and will be announced

Course Description:
Mathematical and physical structures of the Navier-Stokes equation. Exact solutions of the Navier-Stokes equation for viscous flows. Low Reynolds number flows. Incompressible laminar boundary layer flows. Energy equation and heat transfer. Unsteady flows. Instability. Turbulence.

Prerequisite: EGM6812, or equivalent fluid mechanics knowledge;

Text: *Class Notes*

Grading Policy
Homeworks – 30%, Mid-Term Exam – 30%, End-of-Term Exam – 40%
A = [90,100], A- = [87,90), B+ = [84,87), B = [80,84), B- = [77,80), C+ =[74,77), C = [70,74), C- = [67,70), D+ = [64,67), D = [60,64), D- = [57,60), E = [0,57).

Homework, Final Presentation and Exam Policy
Homework and assignments are due at the beginning of the period on the due date. All assignments should be neat and legible. Points will be taken off for sloppy work. You may discuss the assignments with other students, but you are expect to put in individual effort. Copying and plagiarizing assignments will not be accepted.

Academic Honesty
All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. You are expected to uphold academic honesty and failure to comply will result in disciplinary action.

TA & Office Hours: TA for this course is **Josh Garno** **jgarno@ufl.edu**. My office hours are Tuesday 3:00 - 4:00pm, Thursday 3:00 - 4:00pm in 205F PS&T. Josh will announce his ofice hours.

Recommended Books:
Books (1) and (2) are overall the best books for this course - You should purchase one of them. Books (3) and (4) excellent books as well. They are perhaps harder, but they will be most useful as you become more knowlegeble in fluid mechanics. I will use book (5) when we consider boundary layer theory. Book (6) is a classic. I will use book (7) for perturbation theory. Book (8) again a very good source from continuum mechanics perspective.

1. *Incompressible flow*, by R.L. Panton
2. *Viscous Fluid Flow*, by F.M. White
3. *Introduction to Fluid Mechanics*, by G.K. Batchelor
4. *Fluid Mechanics*, by L.D. Landau & E.M. Lifschit
5. *Boundary Layer Theory*, by H. Schlichting
6. *Hydrodynamics*, by H. Lamb
7. *Perturbation Methods in Fluid Mechanics*, by M. Van Dyke
8. *Stromungsmechanik I in Handbuch der Physik*, by J. Serrin

Outline

1. Vorticity equation
2. Exact solutions of Navier-Stokes equations
3. Boundary layer and lubrication theory
4. Solutions by asymptotic analysis and perturbation methods
5. Hydrodynamic stability
6. Introduction to Chaos and Turbulence

Lecture Schedule(*) (tentative)

Week 1	Tue, Jan 7	1	Week 9	Tue, Mar 3	Spring Break
	Thu, Jan 9	1		Thu, Mar 5	Spring Break
Week 2	Tue, Jan 14	1	Week 10	Tue, Mar 10	4
	Thu, Jan 16	No Class		Thu, Mar 12	4
Week 3	Tue, Jan 21	2	Week 11	Tue, Mar 17	4
	Thu, Jan 23	2		Thu, Mar 19	4
Week 4	Tue, Jan 28	2	Week 12	Tue, Mar 24	To be decided
	Thu, Jan 30	2		Thu, Mar 26	To be decided
Week 5	Tue, Feb 4	3	Week 13	Tue, Mar 31	5
	Thu, Feb 6	3		Thu, Apr 2	5
Week 6	Tue, Feb 11	3	Week 14	Tue, Apr 7	No Class
	Thu, Feb 13	3		Thu, Apr 9	5
Week 7	Tue, Feb 18	3	Week 15	Tue, Apr 14	6
	Thu, Feb 20	3		Thu, Apr 16	6
Week 8	Tue, Feb 25	Exam-I	Week 16	Tue, Apr 21	Exam-II
	Thu, Feb 27	4			

(*) **Note:** Both Tuesday and Thursday classes are for 2 periods. This allows me to make up for days I am on travel. The above lecture schedule covers a total of 45+ periods.