

## MIE1201H – ADVANCED FLUID MECHANICS (Winter 2018)

### MIE FLUID MECHANICS COURSES:

MIE312H1F	Fluid Mechanics I (core course)
MIE414H1F	Fluid Mechanics II (elective course): Applied Fluid Mechanics (2014 onwards)
MIE1201H1F	Fluid Mechanics III (up to 2009): Advanced Fluid Mechanics I (2010 onwards)

**PREREQUISITES:** Any introductory fluid mechanics course, differential and integral calculus, and previous exposure to partial differential equations.

**DESCRIPTION:** This fundamental course develops the conservation laws governing the motion of a continuum and applies the results to the case of Newtonian fluids, which leads to the Navier-Stokes equations. From these general equations, some theorems are derived from specific circumstances such as incompressible fluids or inviscid fluids. Basic solutions to, and properties of, the governing equations are explored for the case of viscous, but incompressible, fluids. Topics included involve exact solutions, low-Reynolds-number flows, laminar boundary layers, flow kinematics, and 2D potential flows.

**TEXT:** *Fundamental Mechanics of Fluids*, 4<sup>th</sup> ed., I.G. Currie, CRC Press (2012).

Amazon: CAD \$148.15  
UofT Bookstore: Available starting this week

Part I:	Governing Equations	Chapters 1 - 3
Part II:	Ideal-Fluid Flow (effects of inertia)	Chapters 4 - 6
Part III:	Viscous Flow of Incompressible Fluids (effects of viscosity)	Chapters 7 - 10
Part IV:	Compressible Flow of Inviscid Fluids (effects of compressibility)	Chapters 11 -13
Part V:	Methods of Mathematical Analysis	Chapter 14

**LECTURES:** Tuesdays, 9:10 am to 12 pm, with 10-minute breaks after each hour (two breaks)  
Informal format – questions are welcome. Note taking is necessary.

**TOPICS:** MIE1201 covers Chapters 1, 2, 3, 7, and 9 (parts of Ch. 4, 8, and 14 as required)

**GRADING:**

Homework Assignments (6)	30%
Midterm (x2)	30%
Final Exam	40%

**MIDTERMS:** February 20 and March 20, 2018 (75 min each), beginning of the lecture

**FINAL EXAM:** Tuesday, April 17, 2018 (2.5 hrs)