

Advanced Fluid Mechanics (ACM 40890)

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January 2025

1 Overview

In this document, I explain the format of ACM 40890 in the Spring Trimester 2024/2025, starting in Week 1, Monday January 20th, 2025.

Version history:

- First version, 19th September 2024
- Second version, 29th January 2025 - *fixed header line*

2 Mode of Delivery

The instruction in this module is planned to be primarily face-to-face.

VLE

Brightspace will not be used for this module. Instead, all materials will either be emailed to the students directly, or posted on the module website:

<https://maths.ucd.ie/~onaraigh/acm40890.html>

In particular, there is a complete set of lecture notes in book form, which will be emailed to the students in advance of Week 1.

Format of module

- Two lecture-hours per week (Wednesdays from 1pm to 3pm).
- Office hours can be arranged on request.

3 Assessment

Assessment as follows:

- One one-hour exam during / after the midterm break, worth 50%.
- Group projects, submitted towards the end of the trimester (negotiable), worth 50%.

4 How to succeed in the module

The exam: In the first half of the module, that is, in the seven weeks up to the midterm break, we will be looking at Chapters 1–5 and 10–13 (inclusive) in the lecture notes. These chapters are theoretical in nature. To illustrate the concepts being taught, each chapter in the notes contains exercises at the end. The notes also contain model answers to these questions. The exam will be based exclusively on these exercises – *if you study the exercises, you will pass the exam.*

Group work: In the second half of the module, after the midterm break, you will be put into small groups and asked to complete a number of interesting but challenging assignments on experimental and computational topics in Fluid Mechanics. A group report must be completed for each assignment and these will be graded.

5 Integrity in assessment

The usual rules around plagiarism and copying apply to all elements of assessment in the module. There is a university plagiarism policy; students are encouraged to familiarize themselves with it. The School of Mathematics and Statistics has developed a protocol to give effect to this policy. Both documents will be made available to students at the start of the module. In addition, for the group assignments, there will be a coversheet containing a statement about who contributed what to each project. It should be the same coversheet for all group members.

6 Please don't fail the module!

But if you do, there will be a resit in the autumn trimester, based on a two-hour final exam.

7 Grading

The standard university percentage-to-grades conversion scheme applies:

<https://maths.ucd.ie/tl/grading/en02>

8 Textbooks

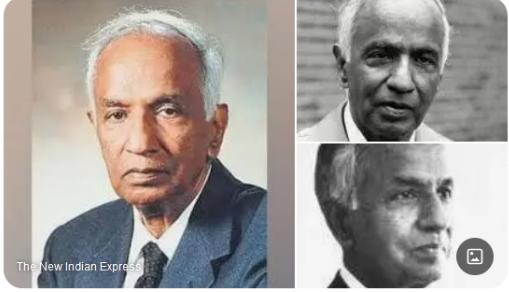
The lecture notes are self-contained. However, there are three key texts which inspired the author in the production of the lecture notes:

- Chandrasekhar, S., 2013. Hydrodynamic and Hydromagnetic Stability. Courier Corporation.
- Drazin, P.G. and Reid, W.H., 2004. Hydrodynamic stability. Cambridge University Press.

- Pope, S. B., 2000. *Turbulent Flows*. Cambridge University Press.

The first book is quite nice as it's a Dover publication and as such is available on online bookstores for under 30 euro. The author is the winner of the 1983 Nobel Prize in Physics for his contributions to the theoretical modelling of the structure of stars (Figure 1).

Subrahmanyan Chandrasekhar
Indian-American theoretical physicist



Born
19 Oct
1910
Lahore,
Pakistan

Died
21 Aug
1995
Chicago,
Illinois, United...

The University of Chicago
It was written in the stars - The University of Chicago Magazine
Astrophysicist Subrahmanyan Chandrasekhar (1910-95) illuminated stellar evolution. ... Subrahmanyan...

Harvard University
Subrahmanyan Chandrasekhar - The Man Behind The Name
The Man Behind The Name ... NASA's...
15 May 2024

Wikipedia
https://en.wikipedia.org/wiki/Subrahmanyan_Chandrasekhar

Subrahmanyan Chandrasekhar
an Indian-American theoretical physicist who made significant contributions to the scientific knowledge about the structure of stars, stellar evolution and ...
[Chandrasekhar limit](#) · [Chandrasekhar family](#) · [Chandrasekhar number](#) · [Otto Struve](#)

People also ask :

What did Chandrasekhar discover?

About
Subrahmanyan Chandrasekhar FRS was an Indian-American theoretical physicist who made significant contributions to the scientific knowledge about the structure of stars, stellar evolution and black holes.
[Wikipedia](#)

Born: October 19, 1910, [Lahore, Pakistan](#)
Died: August 21, 1995 (age 84 years), [Chicago, Illinois, United States](#)
Education: [Trinity College](#) (1930–1933), [MORE](#)

Figure 1: Screenshot prompting students to read up on the life and times of Subrahmanyan Chandrasekhar, author of *Hydrodynamic and Hydromagnetic Stability*. A quote by Carl Sagan from Wikipedia about Chandrasekhar's lectures: 'frivolous questions' from unprepared students were 'dealt with in the manner of a summary execution', while questions of merit 'were given serious attention and response'. ACM 40890 is unlikely to be as tough.