

# ICTP-ESP Diploma Course / ESFM PhD Program

2015–2016 Fluid Mechanics

*Riccardo Farneti*  
(ESP Section, ICTP)

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<b>Lecture 1</b>	Introduction to Fluid Mechanics and Properties of Fluids I
<b>Lecture 2</b>	Properties of Fluids II and Statics
<b>Lecture 3</b>	Scalars, Vectors, Tensors, Gradient, Divergence, Curl, Gauss' and Stokes' theorem
<b>Lecture 4</b>	Kinematics: Material derivative, streamline, streamfunction, strain rates, relative motion near a point, Vorticity and circulation
<b>Lecture 5</b>	Conservation laws I: Mass, tracer, Advection-Diffusion Equation
<b>Lecture 6</b>	Conservation laws II: Momentum and the Navier-Stokes Equations
<b>Lecture 7-8</b>	Conservation laws II: Energy and Bernoulli equations
<b>Lecture 9</b>	Vorticity dynamics (Kelvin's Theorem)
<b>Lecture 10</b>	Boussinesq approximation, the governing equations of GFD, Geostrophic flow
<b>Lecture 11</b>	Dynamic similarity and non-dimensional numbers
<b>Lecture 12</b>	Laminar and turbulent boundary layers

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- Each lecture is 1.5 hour long, for a total of 18 hours.
- This is a preliminary schedule and may be revised during the course.
- TEXTBOOKS: any textbook on Fluid Mechanics, but particularly: 'Fluid Mechanics' by P. K. Kundu and 'Physical Fluid Dynamics' by D. J. Tritton.

Lecturer: Riccardo Farneti (rfarneti@ictp.it)