# Applied Computational Fluid Dynamics
MECE 539

A unique course designed for advanced users of mature CFD packages (commercial and non-commercial). **Aimed at top undergraduate students** planning to specialize in Thermofluids and Aerospace fields, **and graduate students** whose research does not involve model development, this course assumes access to a fully developed CFD code. This allows the course to **focus on the knowledge required to properly setup, solve and analyze a CFD simulation.** Theory is put to practise with realistic tutorials and assignments.

Instructor: Dr. Carlos F. Lange

Pre-Requisites: MECE 330, MECE 390. MECE 430 strongly recommended.

Objectives:
➢ Practise the methodology of numerical flow analysis: model selection and simplification; pre-processing; solution; post-processing.
➢ Identify, verify and assess errors in a numerical flow solution.
➢ Make appropriate decisions that improve the quality and accuracy of a numerical solution.
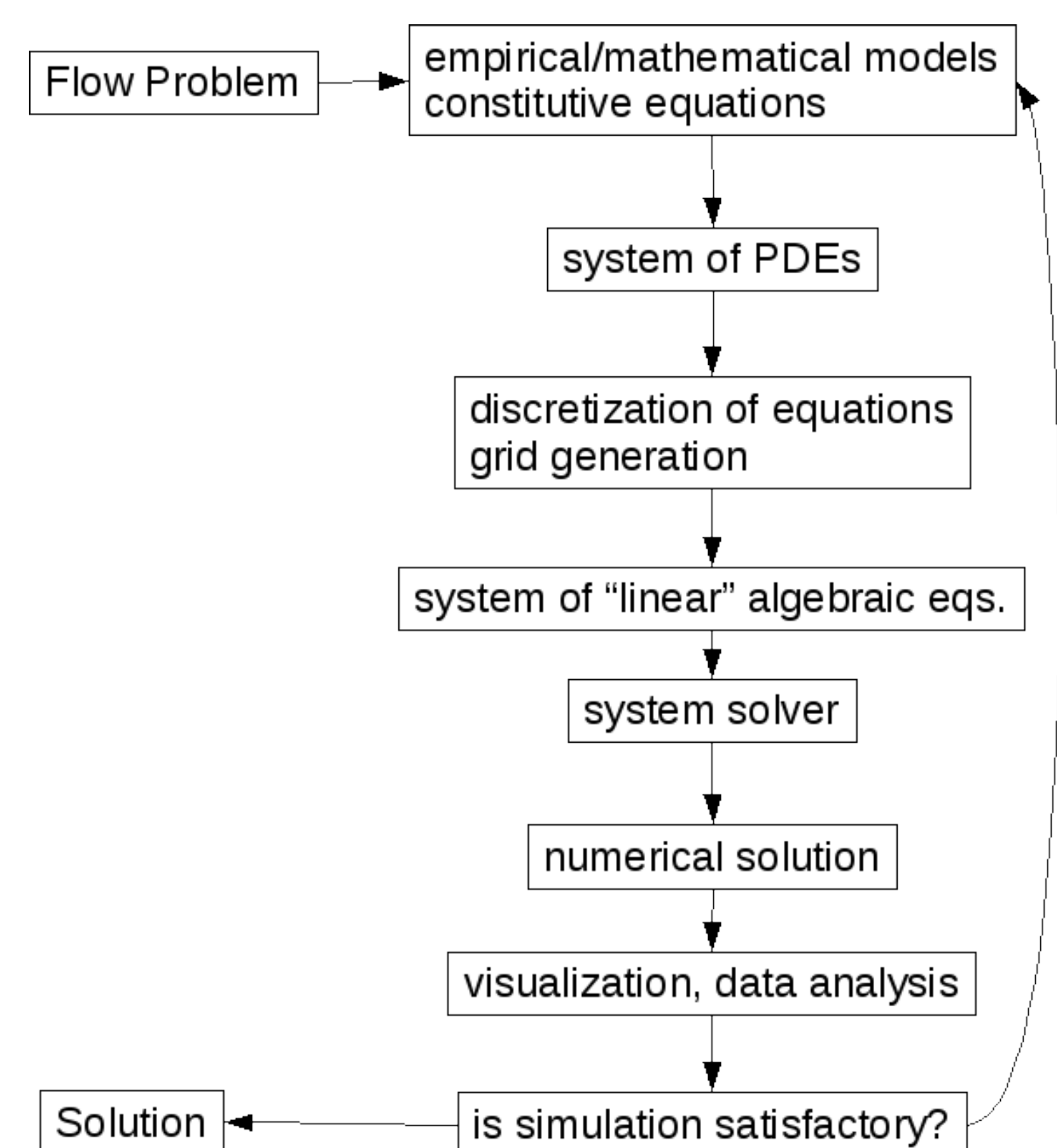
Topics covered:
➔ Review of Fluid Mechanics
➔ Review of Numerical Methods
➔ Grid Generation and Refinement
➔ Model Selection (Turbulence)
➔ Solution Strategies and Criteria
➔ Verification & Validation
➔ Best Practises

Hands-on Tutorials and Assignments.

Free form final project.

Flow Problem → empirical/mathematical models constitutive equations → system of PDEs → discretization of equations grid generation → system of "linear" algebraic eqs. → system solver → numerical solution → visualization, data analysis → is simulation satisfactory? → Solution