Simulation–Based Design Laboratory (SBDL)
Graduate course in Aeronautical Engineering
Prof. Umberto Iemma

Syllabus - 6 CFU option

#	TOPIC	Classes (h)	Homework (h)
1	Tools, software and textbooks	2	4
2	Setup of the computational environment	4	6
3	Assessment of the computational environment: coding, compilation, execution, i/o, post–processing	4	6
4	Linear algebra problems: matrix multiplication, linear systems	4	6
5	Coding practices for performance: cache–miss minimization	2	4
6	Use of external libraries. Eigenproblems	4	6
7	Polynomial interpolation	2	6
8	Integration of ODE: explicit/implicit methods, Liapunov stability	4	6
9	Numerical integration: Newton–Cotes quadratures, Gaussian quadratures	2	6
10	Numerical statistics: mean, standard deviation, skewness, kurtosis. Evaluation of uncertainty: Monte Carlo method	4	6
11	Systems of non–linear differential equations. Oscillators, chaotic systems, Lorenz attractor	4	6
12	Coding practices for performance: multithreading, message–passing	2	4
	Total time	38	66

Final project, including preparation of the report = 40 h.

Syllabus - 3 CFU option

#	TOPIC	Classes (h)	Homework (h)
1	Tools, software and textbooks	2	4
2	Setup of the computational environment	4	6
3	Assessment of the computational environment: coding, compilation, execution, i/o, post–processing	4	6
4	Linear algebra problems: matrix multiplication, linear systems	4	6
5	Coding practices for performance: cache–miss minimization	2	4
6	Use of external libraries. Eigenproblems	2	6
7	Polynomial interpolation	2	6
8	Integration of ODE: explicit/implicit methods, Liapunov stability	2	6
	Total time	22	44

Final project, including preparation of the report = 20 h.