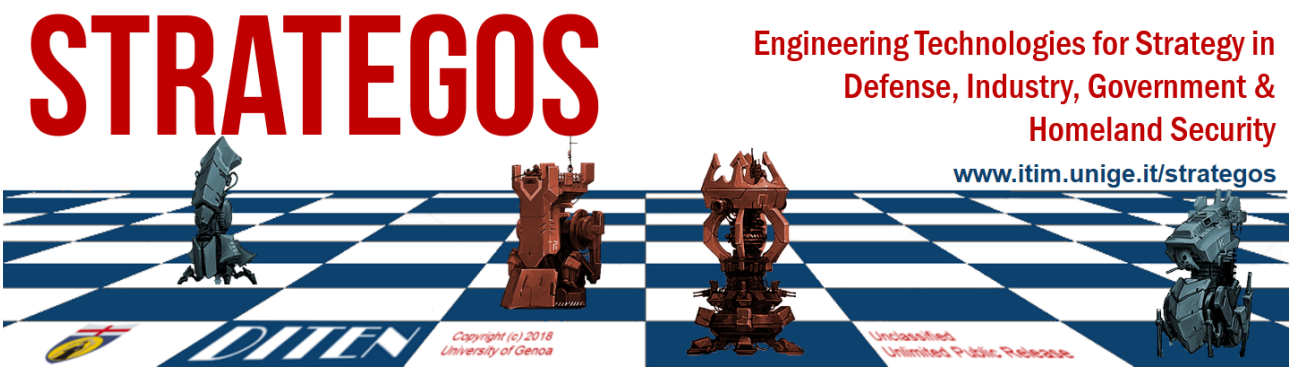


STRATEGOS

Master of Science on Engineering Technologies for Strategy and Security,

Modelling, Simulation, Data Analysis, AI/IA for Strategies on Operations and Systems

Course: Architectures and Models for Numerical Methods

SSD ING-INF/01

Credits: ***5***

Schedule & Timetable:

Schedule 2nd Year, 1st Semester

Teachers, Email, URL:

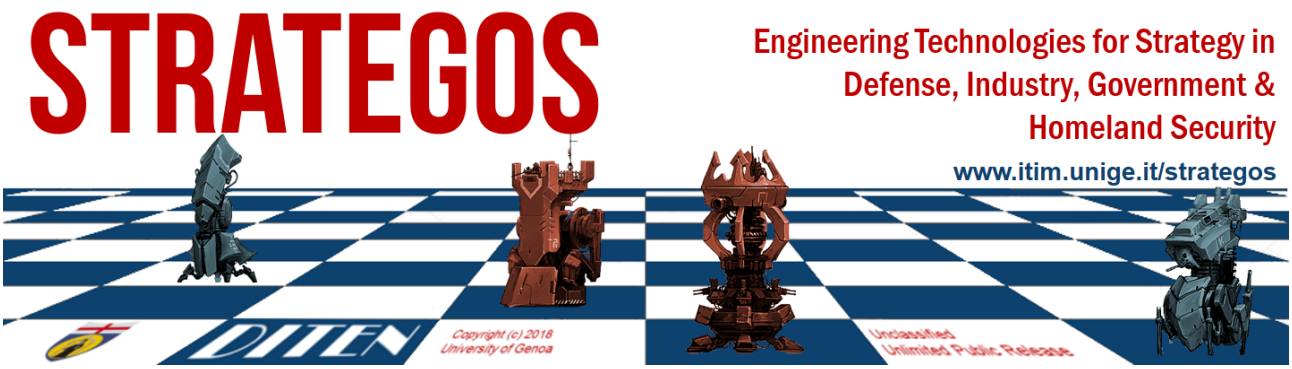
- **Ermanno Di Zitti, dizitti@unige.it**
  www.linkedin.com/in/ermannodizitti

Assistants for Exercises & Simulation Lab Experience:

TBF

Education Objectives:

The course addresses models and architectures for supporting numerical methods devoted to address problems that unsolvable by using known analytic techniques. The module introduces numerical methods and corresponding simulation techniques



Course Program & Elements:

- ***Architectures and Models for Numerical Methods***
  - Foundations of Numerical Models and Architecture
    - Different Concepts and Levels of Error
    - Non Linear Equations and Root Finding Method, Bisection Method, Newton Raphson Method, Secant Method, Regula-Falsi Method
    - Curve Fitting Method, Linear and Non-Linear Fitting, Linear interpolation, Lagrange Interpolation Method, Newton Interpolation
    - Numerical Differentiation, Central Difference Methods, Higher Order Derivatives, Errors
    - Numerical Integration, Simpson's 1/3 and 3/8 Rules, Local & Global Error Analysis
    - Eigenvalue Problems, Heun's Method, Euler's Method, Runge Kutta Method, Gerschgorin Disc Theorem , Jacobi Method
  - Numerical Simulation Techniques
    - Random Number Generation, Best Fitting Methods, Monte Carlo Technique and Simulation, Sampling Methods, Metropolis Algorithm, Heat- Bath Algorithm

Teaching Approach:

Frontal Lectures and Exercises in class.

Evaluation and Final Exam:

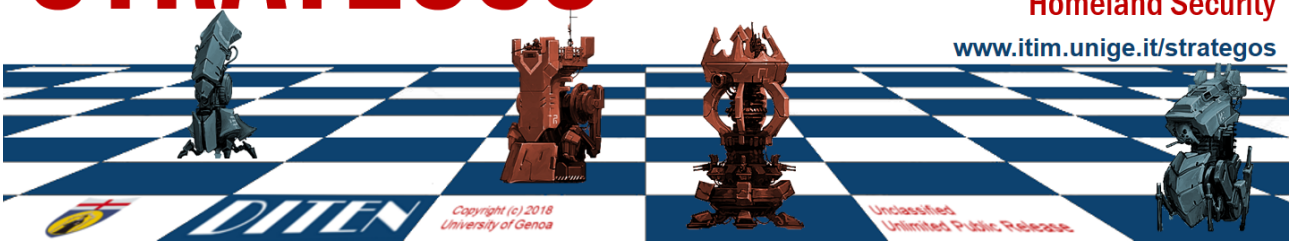
Final Exam will be carried out by Teacher

Time Zone:

Italy (CET), GMT+1

Prerequisites:

The Course does not require specific prerequisites.



References

- Allaire G. (2007) Numerical Analysis and Optimization: An Introduction to Mathematical Modelling and Numerical Simulation, Oxford University Press
- Paranthaman, P. K., Dange, G. R., Bellotti, F., Berta, R., De Gloria, A., Di Zitti, E., ... & Sciutto, G. (2016, September). A Serious Game Architecture for Green Mobility. In International Conference on Applications in Electronics Pervading Industry, Environment and Society (pp. 66-76). Springer, Cham.
- Di Zitti E., GM Bisio, DD Caviglia, M Chirico, G Parodi (1989) Analysis of neural algorithms for parallel architectures, IEEE International Symposium on Circuits and Systems,, 2197-2200