Course Title: Mathematical Physics Models	**Number of Units**
SSD :MAT/07	**CFU: 9**
Course aims: The course is an introduction to mathematical modeling of physical processes. The course presents Lagrange model of Mechanics, Tensor Calculus and elements of Continuum Mechanics.	
Course Description Vector Spaces. Affine Euclidean Point Spaces. Degree of freedom. Generalized coordinates. Virtual work. D'Alembert principle. Lagrange Equations for an holonomic system. First integrals. Ignorable coordinates. Hamilton's canonical equations. Calculus of variations. The brachistochrone and isoperimetric problem. Integral functionals and extrema. Euler-Lagrange equations. Variational problems with constraints. Hamilton's principle. Legendre transformations. Hamilton's canonical equations. The phase space. Canonical transformations. Generating functions. Hamilton-Jacobi Theory. Hamilton-Jacobi equation. Method of separation of variables. Stability of holonomic systems. Liapunov direct method. Liapunov stability and instability theorems. Krasowsky and LaSalle theorems. Linear stability. First approximation method. Routh-Hurwitz criterion.	
Assumed Background: Calculus, Elementary Mechanics.	
Assessment methods: Oral examination	