Department	Diten – Dsa (Università degli studi di Genova)
Master's Degree	Yacht Design (Engineering)
Year/semester	First Year. Second semester.

Course title	Mathematical Physics
ID Course Code	66176
Course Credit (CFU)	6
Scientific-Disciplinary Sector	MAT/07
Course Type	Lectures + practical applications on PCs
Professor	Roberto Cianci, DIME- Math. Division

Education objectives

The course aims to provide a presentation of the most common partial differential equations (PDE) and their solution techniques through an analysis of various applications. The emphasis is devoted to second order PDE and the understanding of the specific techniques for elliptic, parabolic and hyperbolic cases.

Learning outcomes

Introduction to partial differential equations (PDE). The elastic string and the transition from discrete systems to continuous systems .

2 . The differential equations of the second order. The classification and the normal form; elliptic , hyperbolic and parabolic PDE.

3 . Elliptic equations. The harmonic functions. The problems of Dirichelet and Neuman , The Poisson formula for the circle.

4 . The variable separation technique. The series and the Fourier transform . The Gibbs effect, the analysis of normal modes , the delta Dirac "function".

5 . The Bessel functions, the problems in polar coordinates.

6 . The parabolic differential equations, diffusion and heat equations; descriptions in the domain of space and time.

7 . The hyperbolic equations: the equation of D' Alembert. The method of characteristics, the elastic membrane, the mechanical interpretation of the normal modes

8 . PDE of higher order: the biharmonic equation, its Cauchy problem. The vibration of bars and plates.

Assesment	**Hours**
Lectures	40
Practice	10
Laboratory	10

Organization and examinations

Examinations are oral . Some mandatory exercizes can be requested.

Prerequisite	Math – Physics – Hydrodynamics

Bibliography references	Scientific papers available in literature and other documentation provided during lectures and made available through the course web site (www.aulaweb.unige.it)