Code: 1687 **Physics I**
Degree: all 1st cycles
Curricular Year: 1st **Semester Course: 1st**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: António Marcelino Palma de Borja Serafim
Other lecturer(s): Isabel Maria Cerqueira Lopes Alves, José Luís Monteiro Teixeira, Maria do Rosário da Conceição Cameira, Olívio Godinho Patrício, Paulo Guilherme Martins de Melo Matias, Pedro Manuel Leão Rodrigues de Sousa and Rui Marçal Campos Fernando
Web Site: http://www.isa.utl.pt/home/node/3724

1. Contact hours:
Lectures 18 **Lecture/Practicals** 37 **Praticals** 15 **Others** 14 **Total** 84

2. Objectives:

Consolidate knowledge from former years, mainly on mechanics.
Prepare students in topics relevant to the courses at ISA – areas of biophysics (fluid mechanics) and in agreement with international practices for this level.
Training the ability to solve wording problems, the understanding of physical processes and the observation of physical phenomena in ecosystems and daily life.

3. Programme:

MODULE I - MECHANICS
0. Physical quantities. Systems of units. Conventions. Conversions. Dimensional analysis.
1. Vectorial operations and components.
2. Equilibrium of a particle and of a rigid body. Newton's laws. Translation equilibrium. Friction. Rotation equilibrium.
3. Kinematics. Straight line motion equations. Free fall; reference frames.
4. Dynamics. Newton's second law. Gravitation. Inertial reference frames; noninertial forces.
5. Two-dimensional motion. Projectiles. Circular motion. Tangential acceleration and centripetal acceleration. Vertical and horizontal circular motion. Angular velocity and angular acceleration.
6. Work and Energy. Work in straight line motion. Kinetic energy and gravitational potential energy. Conservation of energy. Conservative and dissipative forces. Power.
7. Impulse and momentum. Conservation of momentum. Collisions. Inelastic and elastic collisions .

MODULE II – ELASTICITY, FLUID MECHANICS
1. Elasticity. Traction and compression stress. Shearing stress. Hydrostatic pressure and deformation in fluids. Hooke's law. Bulk modulus. Elastic and plastic behaviour.
2. Hydrostatics. Fundamental principle of hydrostatics. Pascal's principle. Pressure measurement. Buoyancy. Arquimedes principle. Forces on vertical walls. Surface tension. Capillarity.
3. Hydrodynamics. The continuity equation. Bernoulli equation. Viscosity. Poiseuille's law. Reynolds number. Viscous resistance. Stokes' law.

4. Bibliography:

Main Bibliography

YOUNG, H. D. & FREEDMAN R. A. 2003. Sears e Zemansky FÍSICA. Addison Wesley, 12ª ed., São Paulo. ISBN: Vol. I: 978-85-88639-30-0, Vol II: 978-85-88639-33-1
POWER-POINT PRESENTATIONS ANS OTHER NOTES FROM PROFESSOR

Other Bibliography

CUTNELL, J.; JOHNSON, K.W. (1989). Physics. John Wiley & Sons eds., New York.
HALLIDAY; RESNICK (1989). Fundamentals of Physics. John Wiley & Sons eds., 2ª ed., New York.
MARION, J.B. (1980). Physics and the Physical Universe. John Wiley & Sons eds., 3ª ed., New York.
Mc KELVEY, J.P.; GROTCH, H.(1978). Física. Ed. Harper & Row do Brasil, 2ª ed.(1982), S. Paulo, Vol.1 e 2.

5. Assessment:

Final exam or final tests by module. Score required >7.5 per module and > 9,5 average 2 modules or exam.

Mandatory tests by module, either partial or final. Final score of module = weighted average of partial tests and final test

6. Estimated Workload:	168	Hours
7. Last Update:	6/7/2010	