

Code: 1688 Physics II**Degree:** all 1st cycles, except Landscape Architecture**Curricular Year:** 1st**Credits:** 6 ECTS**Language:** Portuguese/English**Responsible:** Maria Isabel Freire Ribeiro Ferreira**Other lecturer(s):** Isabel Maria Cerqueira Lopes Alves, António Marcelino Palma de Borja Serafim, José Paulo Mourão de Melo e Abreu, Olívio Godinho Patrício, Maria do Rosário da Conceição Cameira, Jorge Manuel Martins Soares David and Maria Teresa Gomes Afonso do Paço**Web Site:** <http://www.isa.utl.pt/home/node/3947> or <http://www.isa.utl.pt/der/Fisica/>**Semester Course: 2nd
Compulsory****1. Contact hours:****Lectures 18 Lecture/Practicals 37 Praticals/Laboratory 15 Others 14 Total 84****2. Objectives:**

Consolidate knowledge from former years, mainly on heat.

Prepare students in topics relevant to the courses at ISA – areas of biophysics (thermodynamics, transport equations) and in agreement with international practices for this level, adapted to the ISA profiles.

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 III – HEAT****1. Temperature and thermal expansion.****2. Calorimetry.** Phase changes. Phase equilibrium. Heat capacity. Latent heat.**3. Heat transfer.** Thermal conduction. Free and forced convection. Radiation. Stefan-Boltzmann law. Planck radiation formula. Wien's law.**4. Thermal properties of matter.** Surface pVT for an ideal gas and for a real substance. Phase diagrams. Vapour pressure. Atmospheric humidity.**5. Thermodynamics.** Heat and mechanical energy. Internal energy. First Law of Thermodynamics. Work. Td processes. Work and heat in a cycle. Efficiency of a cycle. Heat capacities of an ideal gas. Adiabatic state equations. Carnot cycle. Second Law of Thermodynamics. Reversibility and entropy.**MODULE IV - TRANSPORT EQUATIONS AND BALANCES OF MASS AND ENERGY****1. Transport equations.** Fick's law. Difusion with mass convection.**2. Analogies between diffusion transport for mass, heat and momentum.** Resistances and conductances. Resistant analogues.**3. Introduction to transport in porous media. Water potential.****4. Water transport in the continuum SPA.****5. Energy and mass balances.** Control volume and fluxes across boundaries. Boundary conditions.**6. Mass balance, applications.** Storage of mass and variation of concentration.**7. Energy balance, applications.** Storage of heat and variation of temperature.**8. Equipments and case-studies:** presentation of equipment for flux measurements and discussion of energy and mass balances in simple case-studies adapted to specific curricula.**4. Bibliography:****Main Bibliography**YOUNG, H. D. & FREEDMAN R. A. 2003. Sears e Zemansky FÍSICA. Addison Wesley, 12^a 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 BibliographyCUTNELL, J.; JOHNSON, K.W. (1989). Physics. John Wiley & Sons eds., New York.HALLIDAY; RESNICK (1989). Fundamentals of Physics. John Wiley & Sons eds., 2^a ed., New York.MARION, J.B. (1980). Physics and the Physical Universe. John Wiley & Sons eds., 3^a ed., New York.Mc KELVEY, J.P.; GROTCHE, H.(1978). Física. Ed. Harper & Row do Brasil, 2^a 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:

10/3/2011