



Physics and Material Science: opportunities of the interdisciplinary link in the Mechanical Engineering curriculum.

A. A. Hernández* and L. A. Del Risco

Physics and Chemistry Department. University of Cienfuegos. Carretera a Rodas Km 4. Cuatro Caminos, Cienfuegos, Cuba. CP 55400. archdez@ucf.edu.cu.

Abstract

Some topics foreseen in Materials Science courses in Mechanical Engineering carriers could be presented in a deeper way and successfully understood by students if they are treated in a special teaching style during Physics courses. This interdisciplinary work required the identification of the related topics and the definition of its treatment within Physics subjects. That included planning and designing of academic activities, innovations in the evaluation system, organization of student scientific work in the first semesters. Such didactic treatment increases the motivation of the students since initial semesters and contributes to raise the professional skills of the future engineer.

Table 1: Some examples of topics related in the interdisciplinary link

Topic in Physics Course	Content in Materials Science
Thermal expansion	Dilatometer method for determine phase transformation
Crystalline structure. X-Ray diffraction.	Identification of phases and phase transformations Measuring of stress in deformed materials
Changes of electric resistance of metallic materials with temperature	Platinum resistance for measurement and control of temperature in furnaces for heat treatment.
Heat capacity	Thermal analysis for determine phase transformation.
Magnetic materials	Allotropic phases in iron. Phase transformations in steels with temperature

References

- [1] Falcón Tanda, H. *“Una concepción teórica de profesionalización como base para el diseño de la disciplina Física General en Ingeniería. Aplicación en la carrera de Ingeniería Mecánica”*. Tesis en Opción al grado de Doctor en Ciencias Pedagógicas, CUJAE. La Habana, 2004.
- [2] Hernández A. *“Las potencialidades educativas de la asignatura Física III de la carrera de Ingeniería Mecánica”*. En CD de trabajos presentados en la Conferencia Científica Internacional de Ingeniería Mecánica COMEC 2008. Universidad Central de Las Villas. ISBN-978-959-250-404-2.