

Course title: Metallic Alloys – selectable / ~~regular course~~

Number of contact hours: 48 hours (33h lectures/15 Lab)

ETCS credits: 4

Course description: The objective of the lecture is to identify and to understand the main metallic alloys used in the field of transportation and energy.

From this knowledge, the students will be able to choose the most suitable materials as well as the necessary thermo-mechanical treatments.

The course covers the iron based materials (steels, cast irons) as well as the influence of various thermal treatments. Introducing the lightweight materials (aluminium, titanium and magnesium) expands the presented concepts to other metallic alloys which are commonly used.

The classical investigations techniques of such materials are also introduced.

Education effects (P7S_UW, P7S_WG):

- Students have a clear view the main families of metallic alloys used for the transportation and energy fields.
- Students know in details the metallurgy of steels, cast irons and aluminum alloys
- Students understand the particularity of other lightweight materials as well as copper based alloys
- Students know the main tools for metallurgical / microstructural characterization

Literature:

1. Steels, microstructure and properties. H.K.D.H Badeshia, R. Honeycombe, Butterworth-Heinemann; 3 edition (September 1, 2006)
2. Worked example in the geometry of crystals. H.K.D.H Badeshia, The institute of Materials (2001) ISBN 0-904357-94-5
3. Physical Metallurgy. 3rd edition Edited by: Robert W. Cahn and Peter Haasen, North Holland (1996) ISBN: 978-0-444-89875-3
4. Materials for automotive body, Geoff Davies (2003) ISBN: 978-0-7506-5692-4
5. X-Ray diffraction crystallography, Y. Waseda, E. Matsubara, K. Shinoda. Ed. Springer-Verlag Berlin Heidelberg (2011) ISBN: 978-3-642-16634-1
6. Aluminium and aluminium alloys, J.R. Davis Ed. ASM (1993) ISBN: 978-0871704962

Assessment method: exam

Prerequisites: Basic knowledge in physics, chemistry and electrochemistry; Basic knowledge in thermodynamics.

Primary target group:

Lecturer: Jeremie BOUQUEREL - Ecole Nationale Supérieure de Chimie de Lille