**Name of the module: Materials Selection**

**Number of module: 365.2.6331**

BGU Credits: 3

ECTS credits:

Academic year: 2010-2011

Semester: 1st semester

Hours of instruction: 3 hours lecture

Location of instruction: will be defined

Language of instruction: Hebrew

Cycle:

Position: a compulsory course for graduate students of Materials Engineering Department

Field of Education: Materials Engineering

Responsible department: Materials Engineering

General prerequisites:

1. BSc. Materials Engineering

Grading scale: the grading scale would be determined on a scale of 0 – 100 (0 would indicate failure and 100 complete success 0 to 100), passing grade is 65.

Lecturer: Prof. Dan Eliezer

Contact details: Room 108

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Office hours:

Wednesday, from 12 to 2 PM

Module evaluation: at the end of the semester the students will evaluate the module, in order to draw conclusions for the lecturer and university's internal needs.

Course Description:

This course covers the topics of Materials Selection Guidelines for materials selection. Materials selection for aerospace and transportation. Light Alloys. Materials for high temperatures - superalloys, refractory metals and alloys. Ceramics. Materials selection for forming, coatings and bearings. Fundamentals of failure analyses of structural materials. Light materials new alloys with novel properties and microstructures. Comparison among the properties of different materials for different technological applications.

Aims of the module:

All engineering designs required ‘at some point' the selection of materials and processes to shape them. This advanced course explores innovative ways of storing material attributes and of comparing them with design requirements' identifying the best choice.

Objectives of the module:

To familiarize students with the knowledge of materials selection in order that they will be capable to evaluate issues. Reference is made to standards covering the respective materials, as well as to typical applications, properties and limitations.

Learning outcomes of the module:

On successful completion of the course the students should be able to:

1. To have general knowledge of the materials selection.
2. To comprehend the detailed operation, functionality and interaction between the various components used in materials, microstructure, mechanical and physical properties of the material, and how to use it in a real system.

Attendance regulation: attendance and participation in class is mandatory. Teaching arrangement and method of instruction: lectures and tutorials that include assignments.

Assessment: Mid-term Exam 30%

Paper 1 30%
Paper 2 and Presentation 40%

 100%

Confirmation: the syllabus was confirmed by the faculty academic advisory committee.

Last update: 21.10.2011

Work and assignments: Review and Present Articles.

Time required for individual work: in addition to attendance in class, the students are expected to do their assignment and individual work: at least 4 hours per week.

Module Content\ outlines:

* Materials Selection Guidelines for materials selection.
* Materials selection for aerospace and transportation.
* Al-alloys, Ti-alloys, Mg-alloys.
* Composites
* Advanced materials.
* Materials for high temperatures - superalloys, refractory metals and alloys. Ceramics.
* Materials selection for forming, coatings and bearings.
* Fundamentals of failure analyses of structural materials.
* Light materials new alloys with novel properties and microstructures.
* Comparison among the properties of different materials for different technological applications.

Required reading:

* Miracle, Daniel B., D. B. Donaldson, and George F. Vander Voort. ASM handbook. ASM International, 2001.
* Lee, Peter W., Yves Trudel, Randall M. German, B. Lynn Ferguson, William B. Eisen, Kenneth Mover, Deepak Madan et al. "ASM handbook." Powder metal technologies and applications/prepared under the direction of the ASM International Handbook Committee, ASM Handbook 7 (1998): 1146.
* Becker, William T., Roch J. Shipley, Steven R. Lampman, Bonnie R. Sanders, Gayle J. Anton, Nancy Hrivnak, Jill Kinson et al. "ASM Handbook." Failure Analysis and Prevention 11 (2002).
* Handbook, A. S. M. "Volume 20." Materials selection and design, (1997).
* Real Case Studies from Professor Dan Eliezer’s experience were discussed and distributed. In addition several papers of Professor Eliezer were distributed as well.