**UNIVERSITY OF CHEMICAL TECHNOLOGY AND METALLURGY**

**FACULTY OF METALLURGY AND MATERIALS SCIENCE**

**CENTRE OF MATERIALS SCIENCE**

**Approved:** .....
Assoc. Prof. Ivan Gruev
Dean, Faculty of Metallurgy and Materials Science

**Master Course MATERIALS SCIENCE AND ENGINEERING**

# SYLLABUS

## ENGINEERING POLYMER MATERIALS

**Specialty:** Materials Science
**Degree of Qualification:** Master of Materials Science and Engineering

Centre of Materials Science: .....

Prof. Donka Angelova
Centre Head

**Sofia 2007**

# Engineering Polymer Materials

Aims

To develop further the ideas of preparation and characterization of organic and inorganic polymers encountered in I and Π Semesters, using the concept of engineering design of these materials and its application to a wide range of cases. To illustrate strategies and to describe in details the way of changing of engineering polymer and their everyday application like polymeric details, coatings and adhesives.

**General description**

This discipline covers the properties of materials and their tailoring to technological problems in particular polymeric materials.

**Syllabus content**

1. Introduction to the major achievements and milestones in engineering polymer materials - 1 h.
2. Stereo specific polymers, high molecular polyethylene and polyethylene oxide - 1 h.
3. Polymers with high physic-mechanical properties 2 h.
4. Fiberglass and organic fiber composites - 3 h.
5. Termostabile and flame retardant polymers - 1 h.
6. Polymer alloys - 1 h.
7. Polymer lattices and their applications - 1 h.
8. Elastomers with high and special characteristics - 2 h.
9. Polymers in textile and shoe industry - 1 h.
10. Polymers in high energetic materials, propellants and explosives -1 h.
11. Polymeric plasticizers for cement - 1 h.
12. Polymers in paper industry - 1 h.

13 Coatings: design, preparation, characterization: hygienic, intelligent coatings 2 h.

14. Adhesives for different materials and applications – 2 h.

Practical work

1. Preparation and characterization of samples from blends of high molecular polyethylene and polypropylene - 4 h.
2. Crosslinking of thermo stabile epoxy resin with acid anhydrides and determination of thermostability of the obtained samples by DTA and TG analyses 4 h.
3. Obtaining of flame resistant polyester - 2 h.
4. Preparation of acrylic lattices with nano particle sizes or core - shell particles - 6 h.
5. Preparation of vulkanizates - 4 h.
6. Preparation and characterization of samples from fiberglass and organic fiber composites - 8 h.
7. Investigation of 3 polymeric plasticizers for gypsum-free cement - 4 h.

8. Determination of the surface of paper, covert with polymeric additives - 4 h.
9. Preparation and determination of water stability of adhesives for wood - 4 h.

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Sofia, (Prof. DrSci. Ivan Glavchev)