

Course: Adhesion and adhesive products		
Language: English		
Lecturer: Prof. Sanja Lučić Blagojević, Prof. Mirela Leskovac		
TEACHING	WEEKLY	SEMESTER
Lectures	2	30
Laboratory	0	0
Seminar	1	15
		Overall: 45
		ECTS: 4

PURPOSE:

To introduce students to the functional characteristics of products which are used as adhesives and sealants in understanding their structure and properties, quality factors and their target applications in bonding technologies. The emphasis is on the effects of surface phenomena, environmental influences and stresses in the application. Within Analysis of samples - a case study in a seminar in selected experimental exercises, students develop specific knowledge and skills that enable them to assess the quality and characteristics of adhesive materials, as well as their choice for a particular purpose.

THE CONTENTS OF THE COURSE:

L-Lectures (1-15); LE-Laboratory exercises; S- Seminar (1);

L (1-3) Application of surface science. Definition and application of following terms: surface tension, surface and interfacial energy, the thermodynamic work of adhesion, wetting, spreading and debonding. Inhomogeneity of surface and measurements.

L (4-6) Practical adhesion. The application of mechanisms and theories in analyzing results of the adhesion bonding. Mechanical, diffusion, adsorption, chemical, electrostatic theory in practice. Criteria for achieving quality adhesion bonds.

LE – Determination of parameters of adhesion

L (7-9) Characterization of surfaces. Analysis of the specificity of polymer surfaces. Application of thermodynamics and solubility parameters in assessing the adhesion properties of the surface. The effects of surface modification. Application of the method for the characterization of surfaces.

L (10-15) The adhesive products. The application of scientific methodology of product engineering in the analysis pyramid of the product. Types of adhesives and sealants. The specifics of their application. Characteristics of the structure and properties of the matrix and the impact on the formulation and implementation of quality factors. Examples of adhesives and sealants given purpose. Structural and non-structural adhesives. Epoxies, urethanes, neoprene,

cyanoacrylates as base adhesives. Acrylic, Bituminous, polysulfide, silicone, polyether and polyurethane sealants. The advanced adhesive products based on nanotechnology. A new generation of silane-terminated organic seal. Analysis of the practical implementation of Adhesion bonding. The elements for optimal selection of adhesives and sealants.

LE – testing of adhesive compound

S

GENERAL AND SPECIFIC COMPETENCE:

General competencies of students complement with application of basic knowledge of surface phenomena, which are essential for proper adhesion at the interface between two materials in the application process of bonding, as well as designing new products for the market. Specific competencies are related to the possibility of appropriate modifications of bonding process by modification and activation of surfaces in industrial applications, as well as the selection of appropriate product for a given application.

KNOWLEDGE TESTING AND EVALUATION:

Partial exam, written exam

MONITORING OF THE COURSE QUALITY AND SUCCESSFULNESS:

Student questionnaire.

LITERATURE:

1. V. Kovačević, Adhezija i adhezijski proizvodi, interna skripta, 2009.
2. A.J. Kinloch, Adhesion and Adhesives; Science and Technology, Chapman & Hall, London, UK, 1995.
3. K.L. Mittal, Adhesion Measurement of Films and Coatings, VSP, Utrecht, 1995.
4. A. Pizzi, K.L. Mittal, Handbook of Adhesive Technology, 2nd Ed., Marcel Dekker, Inc., New York, 2003.
5. K.L. Mittal, A. Pizzi, Adhesion Promotion Techniques: Technological Applications, Marcel Dekker, Inc., New York, 2004.
6. E.M. Petrie, Handbook of Adhesives and Sealants, Mc-Graw-Hill, New York, 2000.