

Subject:	Chemistry of Dental Materials		Code: <i>ULCHBKB/CHDM-ZL/25</i>
Study Programme:	<i>Dental Medicine</i>	Study Period:	<i>1. semester</i>
Evaluation:	<i>Exam</i>	Subject Type:	<i>compulsory</i>
Content:	<i>2 h lectures and 3 h practical exercises / week</i>		<i>total 70 hours</i>

Workplace: **Department of Medical and Clinical Biochemistry, UPJŠ in Košice, FM**

Week	Lectures https://portal.lf.upjs.sk/index-en.php	Practical Lessons https://portal.lf.upjs.sk/index-en.php
1.	OPENING OF THE ACADEMIC YEAR	OPENING OF THE ACADEMIC YEAR Principles of laboratory technique
2.	INTRODUCTION TO THE STUDY OF CHEMISTRY OF DENTAL MATERIALS - Definition of basic terms - Characteristics and classification of dental materials - Mechanical, chemical, physical, and biological properties of dental materials DISPERSION SYSTEMS, WATER, SOLUTIONS - Properties of dispersion systems - True and colloidal solutions, electrolytes - Diffusion and osmosis - Surface phenomena, adsorption	Principles of laboratory technique - Equipment of laboratory bench - Volume measurement
3.	LAWS OF CHEMICAL REACTIONS I - Basics of chemical thermodynamics - Thermochemistry – internal energy, enthalpy, entropy - Gibbs energy, kinetics of chemical reactions - Catalysis - Equilibrium of a chemical reaction	Calculations I. - Stoichiometric calculations - Solutions – calculations Dispersion systems, water, solutions - Preparation of physiological solution
4.	TYPES OF CHEMICAL REACTIONS - Proteolytic reactions, acid-base balance, hydrolysis of salts - pH of solutions, buffer solutions - Formation of a solid state - crystallization - Precipitation and complexation reactions	Calculations II. - Calculation of pH of solutions of acids, bases and salts Use of calcium hydroxide in dentistry - Determination of the solubility of calcium hydroxide in water
5.	ELECTROCHEMISTRY - Oxidation-reduction reactions - Electrode (redox) potential, electrodes of the 1st and 2nd type - Electrolysis - Galvanic cell	Calculations III. - Buffer solutions The effect of acids and bases on the pH of the buffer system - Effect of acids and bases on the pH of the bicarbonate buffer system
6.	METALS - Division and classification, metallic bond - Basic properties of metals – strength, flexibility, conductivity, malleability, corrosion, toxicity - Crystallization, crystalline lattices of metals - The most frequently used metals in dentistry	Laws of chemical reactions - Precipitation reactions - solubility of halogenides - Calculation of the solubility of various compounds from the solubility product constant
7.	GENERAL PROPERTIES OF ALLOYS - Noble and base metals in dental alloys - Cooling curves of pure metals and alloys - Phase diagrams and their use for the preparation of alloys - Eutectic point, eutectic alloys - Alloys in dental materials	Metals and their alloys - Spectrophotometric determination of Fe³⁺ cations in alloys - Corrosion test of dental alloys – solution preparation

8.	1st Revision test on topics from weeks 1 to 7* SELECTED ALLOYS USED IN DENTISTRY, AMALGAMS - The composition of amalgams, their structure and the importance of individual elements in amalgam alloys - Properties of dental amalgams - Phase diagram, setting reactions, corrosion of amalgams - Dental steel	Metals and their alloys - Corrosion test of dental alloys – analytical part - Proof of elements in dental alloys
9.	CERAMIC MATERIALS - Composition of ceramic materials - Properties of ceramic materials - Dental porcelains - Metal-ceramic systems - Dental cements, composition, setting reactions	Calculations IV. - Spectrophotometric calculations Optical methods - Spectrophotometric determination of copper with ammonia
10.	MODEL MATERIALS - Model plaster - production, setting of plaster, mixing ratio - Gypsum volume changes, strength - Classification of dental gypsum - Impression, model plaster, dental stone - The use of basic hydroxides in dentistry	Ceramic materials - Solidification and qualitative analysis of glass ionomer cement
11.	POLYMERIZATION - Characteristics of polymers - Basic reactions of the formation of polymeric substances - Chemical composition of polymers - Classification of polymers	Model materials - Preparation of gypsum by precipitation - Qualitative proof of the presence of ions in the supernatant during gypsum preparation
12.	2nd Revision test on topics of practical exercises, seminars, and calculations I to IV* IMPRESSION MATERIALS - Impression materials, classification and meaning - Solidification reactions of impression materials - Modelling materials: waxes, modelling plaster - Moulding materials: thermal expansion, thermal inversion, heat resistance, porosity, volume changes	Dental polymers - Preparation of agar polymer, preparation of alginate polymer, comparison of their properties
13.	MACROMOLECULAR COMPOUNDS IN DENTISTRY - Denture base polymers, composition, characteristics and properties - Classification of dental polymers - Crown and base polymers, composition, properties - Dental relining materials (liners) - Dental composites - Endodontic materials	Impression materials in dentistry - Effect of water-to-gypsum ratio (V/S) and temperature on gypsum solidification - The effect of temperature on plaster solidification - The effect of chemical catalysts on plaster solidification
14.	3rd Revision test on topics from week 8 to 13* TOOTHPASTE AND MOUTHWASH - Composition – basic elements, thickeners, binders and stabilizing substances, cleaning agents, aromatic substances - Inactive ingredients of toothpaste - Active ingredients of toothpaste - Composition and risk of using mouthwashes	Overall evaluation of practical exercises, seminars and the results of the revision tests - Individual evaluation of students' work

* Students can come to see how their test was graded within one week of the test

Students are obliged to comply with the UPJŠ Faculty of Medicine [Study Rules and Regulations](#), [Disciplinary Rules of Procedure](#) and other internal [basic documents](#) (Legislation and internal regulations and Study rules) of the UPJŠ Faculty of Medicine