

Study programme: Dentistry

Name: Medical Chemistry

Abbreviation: LCH/ZAA11

Course type: 15 h of lectures
30 h of practical training

Course distribution: 1.year, 1.semester

Number of credits: 5

Course Form: Lectures, practical training

Lectures:

Lecturer: Prof. Ing. Jan Vacek, Ph.D.

Study: Continuous

	Date/room	Theme	No. of hrs	Lecturer
1	12.10.2022 TD-2.521	Introduction to general chemistry. Acids, bases, chemical equilibria in solutions, electrochemistry.	2	Vacek
2	26.10.2022 TD-2.521	Organic compounds in dentistry. Structures, physico-chemical properties, biological effects and use in dentistry.	2	Vacek
3	9.11.2022 TD-2.521	Structure and chemical composition of enamel and dentin I. Inorganic components (minerals, chemical properties of hydroxyapatite).	2	Vacek
4	23.11.2022 TD-2.521	Structure and chemical composition of enamel and dentin II. Organic components (low molecular weight compounds, macromolecules), mineralization/ remineralization, chemical components of saliva.	2	Vacek
5	7.11.2022 TD-2.521	Dental materials I. Ceramic materials, dental gypsum, materials for grinding and polishing, metals and alloys.	2	Vacek
6	21.12.2022 TD-2.521	Dental materials II. Macromolecular substances, plastic materials, waxes and impression materials.	2	Vacek
7	4.1.2023 TD-2.521	Active compounds in oral hygiene. Biocompatibility of dental materials	3	Vacek

Practical training:

Leaders: Prof. Ing. Jan Vacek, Ph.D.
Mgr. Martina Bancířová, Dr.

Scheme: Continuous

	Week/room	Theme	No. hrs.
1	19.9. - 23.9.2022 TU-LC1	Laboratory rules, safety, first aid. Basic operations in chemical laboratory. Preparation, dilution and heating of a CuSO_4 solution.	2
2	26.9. – 30.9.2022 TU-LC1	Composition, preparation, dilution and mixing of solutions. Preparation and dilution of a solution of KMnO_4 . Measurement of pH - soft drinks.	2
3	3.10. - 7.10.2022 TU-LC1	Calculations of pH value of solution of acids, bases, and salts. Determination of dissociation constant of acetic acid.	2
4	10.10. - 14.10.2022 TU-LC1	Buffers - calculation and measurement of pH. Buffer capacity.	2
5	17.10. - 21.10.2022 TU-LC1	Solubility product. Preparation of hydroxyapatite and gypsum.	2
6	24.10. - 28.10.2022 TU-LC1 (Holiday 28.10.)	Calculations: Composition, preparation, dilution and mixing of solutions. Equilibria in solutions, ionic strength	2
7	31.10 – 4.11.2022 TU-LC1	Solubility of hydroxyapatite as a function of pH. Volumetric analyses. Chelatometric determination of Ca^{2+} .	2
8	7.11. - 11.11.2022 TU-LC1	Setting and analysis of glass ionomer cement, crystallization of $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$ during setting of gypsum.	2
9	14.11. - 18.11.2022 TU-LC1 (Holiday 17.11.)	Calculations: pH and buffer capacity	2
10	21.11. – 25.11.2022 TU-LC1	Corrosion test of dental alloys.	2
11	28.11. – 2.12.2022 TU-LC1	Spectrophotometric determination of iron in alloy.	2
12	5.12. - 9.12.2022 TU-LC1	Hydrocarbons, alcohols, phenols, amines, carboxylic acids, aldehydes, ketones, polymers – chemical properties, reactivity.	2
13	12.12. - 16.12.2022 TU-LC1	Volumetric analysis – practical test	2
14	19.12. - 23.12.2022 TU-LC1	Replacements	2
15	2.1.2023 - 6.1.2023 TU-LC1	Credit test on principles of methods and calculations in chemistry	2

Completed by: Course unit credit

Requirements: 100% execution of practicals, accepted all protocols, 65% points in continuous tests or at least 65% points in course credit test, practical test. Written examination: at least 65% points

Literature:

Fisher J., Arnold J.R.P. – Chemistry for Biologists, Taylor & Francis, 2nd Ed., USA (2004)
Patrick G. – Organic Chemistry – A very short introduction, Oxford University Press, UK (2017)
Schmalz G., Arenholt-Bindslev D. – Biocompatibility of Dental Materials, Springer (2009)
Manappallil J.J. – Basic Dental Materials, 4th Ed., JAYPEE The Health Sciences Publisher, UK (2016)
Ali H. – Principles of Drug Therapy in Dentistry, JAYPEE, London (2012)