

<b>Name of the course</b>	<b>Physical-chemical treatment of water</b>
Number of instruction hours	20
Outline of course/module content	<p>Types of water sources: groundwater, surface, drinking, waste water-industrial, processes and municipal water.</p> <p>Water chemistry: water equilibrium in the system, equilibrium of carbonates, phosphates, sulfates, cyanide, ammonia and other nitrogen compounds,</p> <p>Physical-chemical treatment of drinking water and waste water:</p> <p>Water softening - softening of calcium hardness, softening of magnesium hardness, the role of carbon (II) oxide in the process of softening water, chemical species in the treated water, the advantages and disadvantages of softening.</p> <p>Disinfection - methods and agents, factors affecting disinfection, chlorine disinfection, ozone disinfection, UV disinfection, the choice of optimal conditions.</p> <p>Ion exchange: synthetic exchange resins, exchange reactions-exchange equilibria and kinetics of exchange, isotherms, ion selectivity and capacity, methods of operation-column design, applications.</p> <p>Cogulation and flocculation: definition, stability of colloids, destabilization of colloids, selection of coagulants and flocculants, transport of colloidal particles-perikinetic flocculation, orthokinetic flocculation.</p> <p>Adsorption: causes and types of adsorption, factor influencing adsorption, adsorption equilibria and adsorption isotherms, kinetics, rates of adsorption, batch and continuous-flow systems, the breakthrough curve.</p> <p>Membrane processes: classification of membrane operations, pressure-driven and electrical operations-reverse osmosis, nanofiltration, ultrafiltration, microfiltration, electrodialysis, membrane module and configurations, physical-chemical principles of rejection and separation models, mass transport in membrane, membrane fouling, design of membrane processes.</p>
Description of instruction methods	Lectures, consultations and seminar papers (lecture 30%; individual work 30%; seminar paper or exam 40%).
Description of course/module requirements	Oral exam. Oral presentation of the seminar paper.