

**Biotechnical Faculty / FOOD SAFETY / TECHNOLOGY AND CONTROL OF WATER QUALITY**

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| <b>Course:</b>                       | TECHNOLOGY AND CONTROL OF WATER QUALITY                                                                                                                                                                                                                                                                                                                        |                 |                     |                                               |
| <b>Course ID</b>                     | <b>Course status</b>                                                                                                                                                                                                                                                                                                                                           | <b>Semester</b> | <b>ECTS credits</b> | <b>Lessons</b> (Lessons+Exercises+Laboratory) |
| 13410                                | Optional                                                                                                                                                                                                                                                                                                                                                       | 3               | 5                   | 2+2+0                                         |
| <b>Programs</b>                      | FOOD SAFETY                                                                                                                                                                                                                                                                                                                                                    |                 |                     |                                               |
| <b>Prerequisites</b>                 | There is no conditioning to other subjects.                                                                                                                                                                                                                                                                                                                    |                 |                     |                                               |
| <b>Aims</b>                          | Through the subject, the student acquires the necessary knowledge and skills for the preparation of drinking water, water for industrial purposes, bottled water and wastewater treatment, primarily from the aspect of water quality control, as well as monitoring and control of the preparation and treatment process.                                     |                 |                     |                                               |
| <b>Learning outcomes</b>             | Explain the basic characteristics of different types of water and the procedures for preparing water for many purposes. 2. Understands the importance and role of ensuring the required quality of water and wastewater, as well as controlling their quality. 3. Knowledge of quality assurance methods (monitoring, preparation and purification processes). |                 |                     |                                               |
| <b>Lecturer / Teaching assistant</b> | Milena Tadić, Assoc. Prof.                                                                                                                                                                                                                                                                                                                                     |                 |                     |                                               |
| <b>Methodology</b>                   | Lectures, laboratory exercises, seminar work, office hours.                                                                                                                                                                                                                                                                                                    |                 |                     |                                               |
| <b>Plan and program of work</b>      |                                                                                                                                                                                                                                                                                                                                                                |                 |                     |                                               |
| Preparing week                       | Preparation and registration of the semester                                                                                                                                                                                                                                                                                                                   |                 |                     |                                               |
| I week lectures                      | Introduction. Classification and properties of water. Water quality indicators. Water quality control.                                                                                                                                                                                                                                                         |                 |                     |                                               |
| I week exercises                     | Introduction to laboratory work. Laboratory equipment.                                                                                                                                                                                                                                                                                                         |                 |                     |                                               |
| II week lectures                     | Technology of obtaining drinking water. Water clarification (filtering, sedimentation, membrane separation). Deferrization and demanganization of water, deodorization and disinfection of water.                                                                                                                                                              |                 |                     |                                               |
| II week exercises                    | Water sampling.                                                                                                                                                                                                                                                                                                                                                |                 |                     |                                               |
| III week lectures                    | Technology of obtaining water for industry and energy plants.                                                                                                                                                                                                                                                                                                  |                 |                     |                                               |
| III week exercises                   | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| IV week lectures                     | Technology of obtaining water for industry and energy plants.                                                                                                                                                                                                                                                                                                  |                 |                     |                                               |
| IV week exercises                    | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| V week lectures                      | Bottled water production technology.                                                                                                                                                                                                                                                                                                                           |                 |                     |                                               |
| V week exercises                     | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| VI week lectures                     | Wastewater - characteristics, origin and dynamics of formation.                                                                                                                                                                                                                                                                                                |                 |                     |                                               |
| VI week exercises                    | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| VII week lectures                    | The influence of wastewater on changes in water quality in natural water systems. Conditions for discharge of waste water into natural water systems.                                                                                                                                                                                                          |                 |                     |                                               |
| VII week exercises                   | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| VIII week lectures                   | Wastewater treatment processes.                                                                                                                                                                                                                                                                                                                                |                 |                     |                                               |
| VIII week exercises                  | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| IX week lectures                     | Mechanical processes of wastewater treatment.                                                                                                                                                                                                                                                                                                                  |                 |                     |                                               |
| IX week exercises                    | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| X week lectures                      | Chemical processes of wastewater treatment.                                                                                                                                                                                                                                                                                                                    |                 |                     |                                               |
| X week exercises                     | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| XI week lectures                     | Biological processes of wastewater treatment.                                                                                                                                                                                                                                                                                                                  |                 |                     |                                               |
| XI week exercises                    | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| XII week lectures                    | Wastewater treatment plants. Control of the efficiency of the wastewater treatment plant.                                                                                                                                                                                                                                                                      |                 |                     |                                               |
| XII week exercises                   | Laboratory analysis of water quality.                                                                                                                                                                                                                                                                                                                          |                 |                     |                                               |
| XIII week lectures                   | Water monitoring. Monitoring design.                                                                                                                                                                                                                                                                                                                           |                 |                     |                                               |
| XIII week exercises                  | Presentation of the seminar work.                                                                                                                                                                                                                                                                                                                              |                 |                     |                                               |

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| XIV week lectures                                                                                                                                                                                            | Presentation of the seminar work.                                                       |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            |                                                            |                                    |
| XIV week exercises                                                                                                                                                                                           | Second midterm exam.                                                                    |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            |                                                            |                                    |
| XV week lectures                                                                                                                                                                                             | Legal regulation in the field of water.                                                 |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            |                                                            |                                    |
| XV week exercises                                                                                                                                                                                            | Makeup second midterm exam.                                                             |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            |                                                            |                                    |
| <b>Student workload</b>                                                                                                                                                                                      | Weekly: 5 ECTS x 40/30 hour = 6 h 40 min The total load for the semester = 106 h 40 min |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            |                                                            |                                    |
| <b>Per week</b>                                                                                                                                                                                              |                                                                                         |                                                            | <b>Per semester</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                            |                                                            |                                    |
| <b>5 credits x 40/30=6 hours and 40 minuts</b><br>2 sat(a) theoretical classes<br>0 sat(a) practical classes<br>2 excercises<br><b>2 hour(s) i 40 minuts</b><br>of independent work, including consultations |                                                                                         |                                                            | Classes and final exam:<br><b>6 hour(s) i 40 minuts x 16 =106 hour(s) i 40 minuts</b><br>Necessary preparation before the beginning of the semester (administration, registration, certification):<br><b>6 hour(s) i 40 minuts x 2 =13 hour(s) i 20 minuts</b><br>Total workload for the subject:<br><b>5 x 30=150 hour(s)</b><br>Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item)<br><b>30 hour(s) i 0 minuts</b><br>Workload structure: <b>106 hour(s) i 40 minuts (courses), 13 hour(s) i 20 minuts (preparation), 30 hour(s) i 0 minuts (additional work)</b> |                                                            |                                                            |                                    |
| <b>Student obligations</b>                                                                                                                                                                                   |                                                                                         |                                                            | Students are required to attend lectures, laboratory exercises, present a seminar paper, do midterm exams and final exam.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                            |                                                            |                                    |
| <b>Consultations</b>                                                                                                                                                                                         |                                                                                         |                                                            | 12:00 - 13:00, Friday                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                            |                                                            |                                    |
| <b>Literature</b>                                                                                                                                                                                            |                                                                                         |                                                            | 1. N. P. Cheremisinoff, Handbook of Water and Wastewater Treatment Technologies, Elsevier, Butterworth - Heinemann, 2002. 2. S. Gaćeša i M. Klačnja, 1994: Water and Wastewater Technologies, Belgrade. 3. J. Đuković, et all, 2000: Water Technology, Tehnološki fakultet Zvornik. 4. R. Vidić, 2005: Water Chemistry, Faculty of Civil Engineering, University of Belgrade, Belgrade. 5. M. Jahić, 1990: Preparation of drinking water, Faculty of Agriculture - Novi Sad. 6. D. Ljubisavljević, et all, 2004: Wastewater Treatment, Faculty of Civil Engineering, University of Belgrade.                                                                                                                       |                                                            |                                                            |                                    |
| <b>Examination methods</b>                                                                                                                                                                                   |                                                                                         |                                                            | - Activity during exercises, Seminar work: (0 - 10 points), - First midterm exam: ( 0 - 20 points), - Second midterm exam: ( 0 - 20 points ), - Final exam : ( 0 - 50 points), A passing grade is obtained if at least 50 points are accumulated cumulatively.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                            |                                                            |                                    |
| <b>Special remarks</b>                                                                                                                                                                                       |                                                                                         |                                                            | /                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                            |                                                            |                                    |
| <b>Comment</b>                                                                                                                                                                                               |                                                                                         |                                                            | /                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                            |                                                            |                                    |
| <b>Grade:</b>                                                                                                                                                                                                | F                                                                                       | E                                                          | D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | C                                                          | B                                                          | A                                  |
| <b>Number of points</b>                                                                                                                                                                                      | less than 50 points                                                                     | greater than or equal to 50 points and less than 60 points | greater than or equal to 60 points and less than 70 points                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | greater than or equal to 70 points and less than 80 points | greater than or equal to 80 points and less than 90 points | greater than or equal to 90 points |