UNIVERSIDADE PRESBITERIANA MACKENZIE
ESCOLA DE ENGENHARIA
ENGENHARIA CIVIL

STUDY PLAN

<table>
<tr><td colspan="3">Curricular component:
Exclusive Course (X) Common Axis ( ) Universal Axis ( )</td></tr>
<tr><td colspan="2">Course:
Civil Engineering</td><td>Thematic Core:</td></tr>
<tr><td colspan="2">Name of Curricular Component:
Basic and Environmental Sanitation II</td><td>Code of Curricular component:</td></tr>
<tr><td>Workload:
(2)</td><td>(2) Classroom
(0) Laboratory
(0) EaD</td><td>Stage: 8th stage</td></tr>
<tr><td colspan="3">Menu:
Study the health conditions of the Brazilian population as well as particularly regional environmental conditions. Teach traditional methods and innovations in planning, management, design, construction, operation, and maintenance of water supply systems, focusing specifically on the water intake (intake, dam, intake channel, grid, sandbox, and pumping station) and transportation (adduction) of raw water to water treatment plants (for further storage and distribution of water for small, medium and large communities).</td></tr>
<tr><td>Conceptual Objetives</td><td>Procedural Objetives and Skills</td><td>Attitudinal Objetives and Values</td></tr>
<tr><td>Develop theoretical background and project experience (applied to real case studies of existing cities) related to a water supply system, considering technical, legal, environmental, and economic aspects.

Learn the fundamentals for designing the components of a water supply system including the water intake (intake, dam, intake channel, grid, sandbox, and pumping station) and transportation (adduction) of raw water (to the water treatment plant).</td><td>Understand the panorama of sanitation conditions in Brazil, critically assessing public health issues and socio-environmental implications. Present an integrated and multidisciplinary assessment for the planning, design and management of water supply systems. Develop the theoretical foundations and advanced techniques for sizing the components of a water supply system including water intake and transportation of raw water (before treatment). Analyze and develop projects applied to study cases of existing cities. Learn about international experiences and the state of the art in basic sanitation.</td><td>Consider the use of theoretical foundations and advanced techniques for designing the components of water intake and adduction of a water supply system. Act ethically when making decisions involving financial, economic and social aspects, among others. Enable adequate supervision, coordination and technical guidance, through appropriate standardization, measurement and quality control. Have initiative, independence and responsibility in learning, carrying out, with conscience and in an ethical way, proposed tasks and lists of exercises, meeting the determined deadlines. Become aware of a continuous and systematic study of the curricular component during the course, in order to take advantage of it, with the help of the books indicated in the bibliography. Maintain a correct attitude regarding attendance, participation and attention to classes, avoiding parallel conversations and maintaining focus on content. Respect the start and end times of a class.</td></tr>
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Program content:

1. GENERAL CONCEPTS OF A WATER SUPPLY SYSTEMS.

2. SOURCES OF WATER INTAKE AND WATER CONSUMPTION.

3. SELECTION OF LOCATION FOR A WATER INTAKE. DESIGN OF A DAM FOR WATER INTAKE.

4. DESIGN OF AN INTAKE CHANNEL AND GRIDS (FOR REMOVAL OF COARSE MATERIAL).

5. DESIGN OF A SANDBOX (FOR REMOVAL OF FINE MATERIAL).

6. DESIGN OF PUMPING STATION (INCLUDING SELECTION OF PUMPS).

7. DESIGN OF AN ADDUCTION (TRANSPORTATION) SYSTEM OF RAW WATER.

8. ECONOMIC ANALYSIS OF DIFFERENT PIPELINE DIAMETERS.

Methodology:
Organization and resolution of engineering problems (based on real case studies) involving data analysis, maps and models, which contribute to finding an adequate solution for the design of a water supply system. Interactive classes with case studies, group work to design a system in an existing city, and bibliographical research. Classes will be theoretical and practical using blackboard, multimedia projector, microcomputers for students, computer network resources, software, geographic databases and vector/matrix images. The curriculum component will be supported by the Moodle environment. The student is expected to have a proactive behavior.

Evaluation criteria:

Two intermediate assessments NI1 and NI2 will be carried out.

The first intermediate assessments NI1 includes a written exam (AAN1) and project development (by a group of students) of initial components (first part) of the water supply project (AAP1).

NI1 will be determined by: **NI1** = AANI1x0,50 + AAP1x0,50

The second Intermediate assessment NI2 includes a written exam (AAN2), development (by a group of students) of additional components (second part) of the water supply project (AAP2) and a general evaluation exam (AV1)

NI2 will be determined by: **NI2** = AAN2x0,40 + AAP2x0,40 + AV1x0,20

The Partial Average (MI) will be calculated by: **MI** = 0.4*NI1 +0.6*NI2

If MI ≥ 6.0 & mandatory attendance of at least 75%, the final assessment called PAF (final written assessment exam) is not required, and the student passes.

The Final Average (MF) is calculated by: **MF** = 0.5*MP + 0.5*PAF

Approval: MF ≥ 6.0 with mandatory attendance of at least 75%

Approval criteria follow the UPM Academic Regulations for Undergraduate Courses.

Basic Bibliography:

AZEVEDO NETTO, José M. de. Manual de hidráulica. São Paulo: Edgard Blücher, 1998.
RICHTER, Carlos A.; AZEVEDO NETTO, José M. de. Tratamento de água: tecnologia atualizada. São Paulo: Edgard Blücher, 2005.
TSUTIYA, Milton T. Abastecimento de água. São Paulo: ABES-SP, 2006.

Complementary Bibliography:

AMERICAN WATER WORKS ASSOCIATION. Água: tratamento e qualidade. Rio de Janeiro: Usaid, 1964. 465 p.
FACHIN, Zulmar; SILVA, Deise Marcelino da. Acesso à água potável: direito fundamental de sexta dimensão. 2. ed. Campinas, SP: Millennium, 2012.
HAMMER, Mark J. Sistemas de abastecimento de água e esgotos. Rio de janeiro: LTC - Livros Técnicos e Científicos, 1979.
MORENO, José.; QBAR, Nizar. Manual de controle da qualidade e operação do sistema de abastecimento de água. São Paulo: AESABESP, 2012. 332 p.
VALENCIA, Jorge Arboleda. Manual de tratamiento de aguas potables. Caracas: Programa de Educacion de Ingenieria Sanitaria, 1969. .

Course Coordinator:	**Unit Director:**
Kamila Rodrigues Cassares Seko	Marcos Massi

Signature **Deputy Coordinator:** Eric Ribeiro da Silva Signature	 Signature