SYLLABUS [1]

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty[2]/ Department [3]	Civil Engineering/MMUT
1.3 Chair	—
1.4 Field of study (name/code[4])	Civil Engineering/80
1.5 Study cycle	bachelor
1.6 Study program (name/code/qualification)	Civil Engineering (in English)/10/Engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[5]			Fluid Mechanics and Machines/DD				
2.2 Coordinator (holder) of course activities			Prof.dr.ing. Romeo SUSAN-RESIGA				
2.3 Coordinator (holder) of applied activities[6]			Conf.dr.ing. Adrian STUPARU				
2.4 Year of study[7]	2	**2.5** Semester	3	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [9]

3.1 Number of fully assisted hours / week	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	2 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			
3.7* Number of hours of unassisted activities / semester	28 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			
3.8 Total hours / week [10]	6				
3.8* Total hours /semester	84				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	• Mathematics, Physics
4.2 Competencies	•

[1] The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs
[3] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[4] The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.
[5] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[6] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[7] Year of studies in which the discipline is provided in the curriculum.
[8] Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).
[9] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[10] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

6. Specific competencies acquired through this discipline

Specific competencies	• Understand the properties and general laws of motion and static for different fluids
Professional competencies ascribed to the specific competencies	• Design of structural elements in civil engineering, specific to graduated study programme • Technological and economical design for the erection, operation and maintenance works in civil engineering, specific to graduated study programme
Transversal competencies ascribed to the specific competencies	• Documentation in Romanian and foreign language, in view of professional and personal development, via continuous learning and efficient adaptation to the new technical specifications

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• The course objective is to present the properties and general laws of motion and static for different fluids, of which presence in the daily life is frequent: drinking water, used waters, gases. The main applications of these fluids are presented together with the important hydraulic machine which operates with these fluids
7.2 Specific objectives	•

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
Fluids and their properties: Fluid definition. Shear stress and shear strain rate. Dynamic viscosity. Kinematic viscosity. Vapour pressure and cavitation	2	lecturing, conversation, explication, demonstration
Fluid statics: Fluid statics, fluids at rest. Forces acting on a fluid element. Equilibrium equation in statics. Liquids at rest in gravitational field. Pressure variation. Hydrostatic forces on submerged body. Buoyancy. Principle of Archimedes. Floating. Pressure measurements. Hydrostatic force on surfaces	6	
Flow kinematics: Variation of flow parameters in space and time. Steady and unsteady flows. Describing the pattern of the flow. Acceleration of fluid particles.	6	
Fluid dynamics: Continuity equation .Euler's equation of motion. Bernoulli's equation. The steady-flow energy equation in practice. Flow through a small orifice and a submerged orifice	6	

[11] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[12] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Flow in pipelines: Hydraulic losses in a circular straight pipe. Loss coefficient for turbulent flow in pipes. Local losses	4	
Fluid machinery. Pipe-machine systems: Centrifugal pumps, construction, main components and main parameters. Characteristic curves for a centrifugal pump. Recommended operating range. Pump operation in a pipe system, required head and determination of the operating point. Parallel and serial arrangement of pumps, equivalent head vs. Discharge characteristic	4	

Bibliography [13] 1. Anton, L.,E., Baya, Al., Mecanica fluidelor, maşini hidraulice şi acţionări, ISBN 973-8391-65-2, Editura Orizonturi Universitare, Timişoara, 2002.
2. Anton, L., E., Baya, Al., Miloş, T., Resiga, R., Mecanica fluidelor experimentală, ISBN 973-8391-72-5, Editura Orizonturi Universitare, Timişoara, 2002.
3. Anton, L., E., Baya, Al., Miloş, T., Stuparu A., Hidrodinamică experimentală, ISBN 978-973-638-330-4, Editura Orizonturi Universitare, Timişoara, 2007.
4. Anton, L.E. et al., Mecanica fluidelor, maşini hidraulice şi acţionări. Aplicaţii de calcul, ISBN 973-638-076-9, Editura Orizonturi Universitare, Timişoara, 2004.
5. Ancuşa, V., Culegere de probleme de Mecanica fluidelor şi maşini hidraulice, Centrul de multipicare Universitatea Tehnică Timişoara, 1993

8.2 Applied activities [14]	Number of hours	Teaching methods
Seminar: Fluid properties (2 hours); Pressure measurements (2 hours); Continuity equation (2 hours); Bernoulli's equation (4 hours); Flow in pipelines (2 hours); Fluid machinery (2 hours)	14	explication, example, solving exercises, conversation, experiment, data processing and interpretation
Laboratory: Presentation of the laboratory and safety rules of operating the equipments (2 hours); Fluids in rigid-body motion: rotating cylinder (2 hours); Flow rate measurements with an orifice plate (2 hours); Flow rate measurements with flow rate meter with oscillating flap and an weir with rectangular notch (2 hours); Energy loses in pipe fittings (2 hours); Experimental determination of the characteristics of a centrifugal pump with variable speed (2 hours); Missing laboratory recovery (2 hours).	14	

Bibliography [15] 1. Anton, L.,E., Baya, Al., Mecanica fluidelor, maşini hidraulice şi acţionări, ISBN 973-8391-65-2, Editura Orizonturi Universitare, Timişoara, 2002.
2. Anton, L., E., Baya, Al., Miloş, T., Resiga, R., Mecanica fluidelor experimentală, ISBN 973-8391-72-5, Editura Orizonturi Universitare, Timişoara, 2002.
3. Anton, L., E., Baya, Al., Miloş, T., Stuparu A., Hidrodinamică experimentală, ISBN 978-973-638-330-4, Editura Orizonturi Universitare, Timişoara, 2007.
4. Anton, L.E. et al., Mecanica fluidelor, maşini hidraulice şi acţionări. Aplicaţii de calcul, ISBN 973-638-076-9, Editura Orizonturi Universitare, Timişoara, 2004.
5. Ancuşa, V., Culegere de probleme de Mecanica fluidelor şi maşini hidraulice, Centrul de multipicare Universitatea Tehnică Timişoara, 1993

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

[13] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[14] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".
[15] At least one title must belong to the discipline team.

- Technical knowledge provided by this discipline is in accordance with the demanding of the employers from the domain of Civil Engineering

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Grade	Exam	34%
10.5 Applied activities	**S:** Grade	Exam	33%
	L: Grade	Report	33%
	P[17]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [18])			
• Answer correctly to 5 out of 10 theoretical questions and solve at least 1 of 2 exercises.			

Date of completion

18.01.2018

Course coordinator (signature)

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Coordinator of applied activities (signature)

……

Head of Department (signature)

……

Date of approval in the Faculty Council [19]

12.02.2018

Dean (signature)

……

[16] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

[17] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

[18] It will not explain how the promotion mark is awarded.

[19] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.