

## Fluid mechanics and hydraulics (II<sup>ND</sup> YEAR, V<sup>TH</sup> SEMESTER)

Credit value (ECTS): 3

Course category:

Domain discipline (mandatory)

Course holder:

Professor PhD. Roșca Radu

### Discipline objectives (course and practical works)

- knowledge and use of the specific concepts: fluid system, fluid particle, hydrostatic forces, equilibrium conditions of the systems of forces, fluid classification;
- knowledge and understanding of fluid mechanical states: fluid rest and motion;
- knowledge and use of motion equations for ideal fluids, continuity equation, Bernoulli equation for the permanent motion of incompressible fluids and its applications;
- knowledge of the main equipment of the hydraulic systems.

### Contents (syllabus)

<b>Course</b>
Generalities; properties of fluids (pressure, viscosity, superficial tension)
Fluid statics: hydrostatic pressure, Pascal's law, Archimedes' law, floating of bodies
Cinematics and dynamics of fluids: continuity equation, Bernoulli's law and its applications
Flow of the real fluids: Reynolds number, pressure losses, flow through pipes and open channels, flow through orifices
Positive displacement pumps; centrifugal pumps; design basics
Hydraulic motors
Dimensional analysis and similarity theory
<b>Practical works</b>
International system of units. Symbols used in hydraulic and pneumatic diagrams
Pressure measurement (U-type manometer, micro manometer, Bourdon type manometer, pressure transducers) and flow measurement
Viscosity measurement
Calculation of pressure losses
Basics of centrifugal pump design
Centrifugal pump characteristics
Positive displacement pumps and motors: knowledge, theoretic flow

### Bibliography

1. Arghirescu, C., D.C.C. Arghirescu, 1999 – *Bazele mecanicii fluidelor*, Editura Fundatiei Universitare "Dunarea de Jos" din Galati
2. Dimache A.N., Iancu I., 2014 – *Elemente generale de hidraulică*, Edit. Conspress, București.
3. Florea, J., Panaitescu, V. , 1979 – *Mecanica fluidelor*, Ed. Didactica si Pedagogica, Bucuresti
4. Florescu I., 2007 – *Mecanica fluidelor – note de curs*, Edit. Alma Mater, Bacău.
5. Ionescu, D., Matei, P., Todirescu, A., Ancusa, V., Buculei, M., 1983 – *Mecanica fluidelor și mașini hidraulice*, Ed. Didactica si Pedagogica, Bucuresti.
6. Muntean Angela, Arsenie D.I., 2014 – *Probleme generale ale mecanicii fluidelor*, Edit. Matrixrom, București.

7. **Roșca R., Vâlcu V., 2000** – *Acționări hidraulice și hidropneumatice*, Edit. Ion Ionescu de la Brad, Iași.
8. **Roșca R., 2015** – *Elemente de mecanica fluidelor și acționări hidraulice*, Edit. Ion Ionescu de la Brad, Iași
9. **Tacă C., Păunescu Mihaela, 2009** – *Acționări hidraulice și hidropneumatice*, Edit. MatrixRom, București

### Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Active participation to the lecture sessions	10%
	Final test	60%
Practical training	Active participation to practical training sessions	30%

### Contact

**Professor Ph.D. ROȘCA RADU**  
 Faculty of Agriculture - USAMV Iași  
 Aleea Mihail Sadoveanu nr. 3, Iași, 700490, Romania  
 Tel: 0040232407650  
 E-mail: [rrosca@uaiasi.ro](mailto:rrosca@uaiasi.ro)