SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

ACADEMIC YEAR: 2019-2020

COURSE: Agricultural and Forestry Basin Hydrology

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

TEACHER: Antonio Coppola

e-mail: antonio.coppola@unibas.it	Web: http://oldwww.unibas.it/utenti/coppola/index.html
Phone: +39 0971 206120	mobile:

Language: Italian

ECTS: (lessons / tutorials/practice): 10 (8 frontal lectures; 2 practice)	n. of hours: 64 hours lectures 32 hours practice	Campus: Potenza School: SAFE Program: LM Forest and Environmental Sciences	Semester: I & II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course will deal with all the main physical processes involved in the hydrologic cycle at the soil surface and the subsurface. The main aim will be to provide basic tools to determine the hydrological parameters for the management and the protection of the water resources in the agricultural and forestry basins.

- **Knowledge and understanding**: the course provides the general principles of agricultural and forestry basins hydrology. At the end of the course, the student will be able to understand the main physical processes involved in the hydrological cycle at basin scale. He will be also able to understand the principles of complex sensor systems and hydrological models to monitor and predict hydrological processes at basin scale
- **Applying Knowledge and understanding**: At the end of the course, the student will have skills to: analyzing hydrological processes in agricultural and forestry basins; monitoring the quality and quantity of water resources in agricultural and forestry soils; using sensors for monitoring all the parameters needed for the hydrological balance at different spatial and temporal scales; applying monitoring and prediction systems to evaluate water resources contamination risks related to point and diffuse pollution sources. He will also be able to select the most suitable methods to map water resources contamination vulnerability at basin scale.
- **Making judgements**: The student will gain the ability to identify and apply procedures and methods suitable to solve hydrological problems at basin scale, even using monitoring and prediction hydrological models
- **Communication skills**: The student will be able to transfer the skills gained during the course, even by using the physical-mathematical and information tools provided by the course
- **Learning skills** : The student will be able to organize logically all the information coming from the course, by identifying time after time the most suitable tools to face issues related to the management and protection ow water resources in agricultural and froestry basins

PREREQUIREMENTS

- LT (3-year degree): Physics; Agricultural and Forestry Hydraulics

SYLLABUS

Lessons

The hydrographic basin; The hydrologic cycle; Hydrological balance; Rainfall measurements and statistical analysis;

The water in natural porous media: Soil Physical and Hydrological properties; Measuring the soil hydrological parameters: Measurement methods of the soil water potential and the soil water content;

Water flow in saturated and unsaturated porous media: Darcy's law for steady-state water flow; Measurement methods for the hydraulic conductivity; Richards' equation for transient water flow

Evapotranspiration: Sensors; Measurement methods and data analysis; Mathematical models for estimating root water uptake;

Groundwater resources; Piezometers; Wells, Groundwater recharge

Surface Runoff: Formation and propagation of the runoff; Runoff Hydrographs; Discharges: Measurement methods and statistical analysis;

Solute Transport in natural porous media: Advection-Dispersion Equation; Stochastic-Convective models; Measurement methods of hydrodispersive parameters;

Groundwater resources protection: Evaluating soil and groundwater resources vulnerability to point - and diffuse-pollution sources

Practices

Monitoring hydrological parameters and data analysis for calculating the hydrological balance at the plot-scale.

TEACHING METHODS

64 hours of lessons 32 hours of laboratory and field practices. During practices students will be asked to calculate the hydrological balance for an experimental field

EVALUATION METHODS

Oral examination at the end of the course. Three questions, one of which related to topics addressed during practices.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Teaching material distributed in classroom and available on-line
- Cavazza L. - Fisica del terreno UTET Torino;
- Jury W. – Soil Physics
- Nebbia G., Ippolito G., Russo Spena A., Viparelli M. – Dispense di Idraulica
- Maione U. – Dispense di Idrologia
- Vieux B.E. – Distributed hydrologic modeling using GIS

INTERACTIONS WITH STUDENTS

- in the office at planned days/hours (usually on Wednesday)
- e-mail

EXAMINATION SESSIONS (Forecast)

Usually the third Wednesday of every month (except August)

EVALUATION BOARD

Antonio Coppola
Alessandro Comegna
Paola D'Antonio

SEMINARS BY EXTERNAL EXPERTS YES