# HND « METIERS DE L'EAU »
# TEACHING CONTENT OF THE PROFESSIONAL TRAINING

## Process engineering of water treatment.


### Theoretical lessons

- Water related-businesses.
- Water cycle.
- Water needs and water resources.
- The law, regulations, water stakeholders and administrative management.
- Production processes of drinking water.
- Recreational waters.
- Urban waste water treatment processes.
- Industrial waste water treatment processes.
- Sludge management (Production, treatment, upgrading)
- Non collective sanitation.

### Practical works

- Physico-chemical testing of waters (Physico-chemical parameters of drinking water and waste water (standardized methods and field methods)
- Water treatment technics on pilot units.
- Production techniques of drinking water (clarification, filtration, disinfection, membrane processes…)
- Techniques of waste water treatments (Physico-chemical treatments, activated sludge …)
- Industrial water treatment techniques. (Ion-exchange resins, ….)
- Practical works on field tests.

## Biology Biochemistry and Microbiology of waters.

### Theoretical lessons

- Living beings in drinking waters and waste waters (bacteria, viruses, protozoans, metazoans)
- Water born diseases.

- Water biochemistry (mineral components, organic components, bacteria metabolism and photosynthesis)
- The big biochemical cycles (Carbon, Nitrogen, Phosphorus, Sulphur …)
- Ecology of aquatic environments.
- Bacterial growth.
- Micro-organisms of waste water treatments.

## Practical works


- The basic techniques in microbiology.
- Bacterial identification (the big classes of bacteria: biochemical and morphological identifications)
- Applications for drinking waters and swimming pool waters: standardized methods of research and count.
- Biological tests.
- Bacterial growth.
- Identification of organisms in activated sludge.

# Electrical systems

## Theoretical lessons

- Protection of persons and equipment (fuses, breakers, residual current device)
- Energy conversion (different kinds of motors and speed controllers)
- Electric power distribution (transformers, wire sections and tension drops)
- The ozone generators (main function and different kinds)

## Practical works

- Measurements of Electricity parameters (current, tension and power)
- Wiring motor controllers, starters and speed controllers
- Use of various industrial devices commonly used
- Measures on industrial sites

## Automation – Control and Remote management

### Theoretical lessons

- Structure and organization of automated systems
- Process Logic Control
- Data acquisition and instrumentation (Flow, pressure, level and temperature measurements)
- Control loop, setting methods

### Practical works

- Study and testing equipment (sensors, actuators and control valves)
- Process and control loops study (level, pressure, flow)
- Wiring measuring and control devices
- Programming on industrial PLC (programmable logic controller)

## Hydraulic engineering

This training aims to provide the future senior technician the necessary knowledge on:

• The understanding of phenomenon related to the hydraulics,

• The technical management of equipment's (facility operations et their maintenance),eoretical lessons

- Basic concepts
- Hydrostatic: pressure, principles of Pascal and Archimedes, action on the sides and structures
- Hydrodynamic: flow in pipes loaded, drop of pressure, pipe networks, emptying tanks, flowmeter, free surface flows, overflows, pumping

## Practical works

They illustrate and confront the concepts developed in theoretical courses, using educational benches:

- Trainer of pressure loss and flow measurement
- Metering bench
- Pumping training station (series and parallel pumps combination, pumps with variable speed control)
- Training bench for free surface flow, overflows …
- Observation – disassembly – assembly actual materials (pumps, valves, flowmeters..)
- Exploitation of information technology and use of professional software

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