



LABORATORY PLANNING GUIDE

L65 Water Treatment Laboratory

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Covered subjects according to the curriculum

Major topics of learning content:

- familiarisation with precipitation and flocculation
 - * effect of the pH value on precipitation
 - * creation of a stable operating state
 - * determination of the required metering quantities (precipitant, coagulant, flocculant)
- functional principle of a lamella separator
- familiarisation with anaerobic water treatment
 - * effects of temperature and pH value on anaerobic degradation
 - * functional principle of a UASB reactor
 - * comparison of single stage and dual stage operation mode
 - * monitoring and optimisation of the operating conditions
 - * identification of the following influencing factors:
 - sludge loading, volumetric loading and flow velocity in the UASB reactor
- fundamental principle of softening and desalination by ion exchange
 - * identification of the different modes of operation of cation and anion exchangers
 - * combined use of cation and anion exchangers for desalination
 - * exchanging capacities and regeneration
- fundamental principle of the activated sludge process
 - * functional principle of nitrification and pre-denitrification
 - * creation of a stable operating state
 - * identification of the relevant influencing factors
 - * efficiency of the pre-denitrification
- fundamental principle of depth filtration by sand filters
 - * observation of the pressure conditions in a filter bed
 - * determination of pressure losses
 - * plotting of Micheau diagrams
 - * principle of backwash
- fundamental principle of separation of solids from suspensions in a sedimentation tank
 - * efficiency of the separation process dependent on
 - solid concentration of suspension, flow rate and position of baffle plate
 - * investigation of flow conditions dependent on
 - flow rate and position of baffle plate

Main concept

The laboratory is designed for accommodation of 24 students + 2 laboratory staff:

- 2 - 4 students form a team and work together at a workstation / training system
- 6 different workstations
- All workstations are floor standing
- 3 of the workstations are equipped with a PC
- Each workstation is equipped with a manual containing technical information, basic theory, experiment instructions, evaluation help and safety advice.
- Student teams are scheduled to change workstations from lab session to lab session in order to perform the entire range of experiments within the course duration.
- Average time per experiment: 90 to 120 minutes.

2 workstations for laboratory staff (with PC and internet access)

1 printer for common use

1 cupboard for small parts, consumables, tools, paper etc.

Initial training provided for laboratory personnel

Trainer: Specialized engineer of G.U.N.T. Gerätebau GmbH, Germany.

To be conducted immediately after installation and commissioning of the equipment.

General topics to be covered for any of the educational systems:

- Basic familiarization with the system.
- Functions and components.
- Overall system configuration aspects.
- Start-up and operational aspects.
- Conduction experiments, including evaluation and calculation.
- Using the system with and without the software (where applicable).
- Trouble shooting and maintenance aspects.
- Hands-on, practical familiarization aspects.
- Seminar participants with the delivered system.
- Details of the manuals.
- Safe operation and preventive maintenance.

Requirements / Utilities

Power supply:

- 230 V / 50 Hz / 1 phase – at least 15 power sockets
- 400 V / 50 Hz / 3 phases – at least 2 power sockets

Water:

- 5 x cold water
- 5 x drain

Laboratory computer network:

- 2 internet connections for staff
- 3 internet connections for students

Location:

- Laboratory space min 84 m²
- This laboratory should be installed on the ground floor

Schedule of requirements

Item No.	Description	Quantity
Item 1	Precipitation and flocculation	1 pcs.
Item 2	Anaerobic water treatment	1 pcs.
Item 3	Ion exchange	1 pcs.
Item 4	Activated sludge process	1 pcs.
Item 5	Depth filtration	1 pcs.
Item 6	Separation in sedimentation tanks	1 pcs.

Laboratory drawing

