Course CIVIL 469

Summary of week#01 (19.02.2025), 4 hours

Presentation:

- Lecturers and assistants
- Course time schedule
- Evaluation
- Accident de Sayano-Shushenskaya 2009

1. **Water cycle and background hydrology**
   - Solar power
   - Key water resource => river flow discharge
   - Definition of a watershed / river catchment area
   - Hydrometry, from measuring water levels and section geometry, through velocities, to obtain discharges. Inherent uncertainty.
   - Hydrological variability vs. forced variability & climate warming

2. **Physical principles of hydropower**
   - Gross head
   - Energy yield (or energy production)
   - Methods to assess hydropower potential
     Surface potential
     Linear potential
     Usable potential (or technically feasible)
     Examples

3. **Hydropower definitions**
   a. Flow Duration curve
   b. Energy yield (in kWh)
   c. Mean annual runoff (MAR, in hm3)
   d. Modulus or Q_{mean}
   e. Floods & Spillage
   f. Eco-flows
   g. Water use (in hm3)

4. **Exercise 1**
   - Low-head run-of-the-river plant ("follower") – Lavey HPP
     Additional background data
     - The Lavey HPP is equipped with vertical Kaplan units (3 x 30 MW)
     - The hydraulic tunnel runs with pressurized flow, is concrete lined, is 4 km long and has an internal diameter of 7.70 m
     - The maximum operational water level upstream is 446 masl.
     - The minimum tailwater level downstream is 412 masl (note: when considering the powerhouse is stopped and there is no river backwater effect).

   - High-head pumping scheme – Lutry SP