<table>
<thead>
<tr>
<th><strong>Subject name</strong></th>
<th>Hydraulic structures – design and exploitation</th>
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<tbody>
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<td><strong>Subject code</strong></td>
<td>IS-HSE-11</td>
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<tr>
<td><strong>Department</strong></td>
<td>Hydraulic Engineering and Geotechnics</td>
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<tr>
<td><strong>Faculty</strong></td>
<td>Environmental Engineering and Land Surveying</td>
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</tbody>
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**Subject supervisor/Lecturer**
- Karol Plesiński PhD
- Leszek Książek PhD
- Andrzej Stryżyński PhD
- Jacek Florek PhD

**General information**
- Teaching period: 1 semester / winter or summer semester
- ECTS credit: 6
- Lectures total: 15
- Lab practical: 30

**Objective and general description**
To acquaint the student with the principle of work of innovative hydraulic structures, they are block ramps. Students will also be familiarized with the hydrodynamics and hydraulics of these objects. They will also be taught to design the block ramp, which will be assisted methods of computing (HEC-RAS numerical model) and calculation programs (VCMaster). In addition, it will be determined impact of the proposed structures in the bed of a mountain stream (flow regime change, changes in hydrodynamic parameters, changes in the morphology of the bed of the stream and sediment transport).
Subject also introduces issues with knowledge from construction of hydraulic structures close to nature and fluvial geomorphology (oversized grain structure, cross-ribbed).

**Lectures**
- 7 x 2 +1 hours
  1. Hydraulic structures introduction and the classical hydraulic structures
  2. The block ramps and other hydraulic structures close to nature
  3. Numerical modeling and calculation of hydraulic structures
  4. Exploitation problems of block ramps
  5. Methods of river training close to nature
  6. Hydraulic parameters of water flowing in river channels
  7. Bed-load transport in river channels

**Lab practicals**
- 15 x 2 hours
  1. Design of block ramp
  2. Numerical modeling of hydraulic parameters in the block ramp
  3. Field trip - the kind of block ramp, examples from Polish Carpathians (optional)

**References**
2. Radecki-Pawlik A., Plesiński K. "Boulder ramps: selected hydraulic, environmental and designing problems. The case of Polish Carpathian streams” Wydawnictwo UR, 2017, Kraków, s.102, monografia