**Energy Systems**

<table>
<tr><td>Module title</td><td colspan="3">Energy Systems</td><td colspan="2">Module-Code</td><td>TBD</td></tr>
<tr><td>Duration</td><td>1 semester</td><td>Semester</td><td>Fall/Spring Semester</td><td colspan="2">Module-Start</td><td>1,2,3</td></tr>
<tr><td rowspan="2">Credit points</td><td rowspan="2">6 CP</td><td rowspan="2">Workload</td><td rowspan="2">180 h</td><td colspan="2">Contact hours</td><td>48 h</td></tr>
<tr><td colspan="2">Individual study</td><td>132 h</td></tr>
<tr><td>Module coordinator</td><td colspan="3">TBD</td><td>Language</td><td>English</td></tr>
<tr><td>Syllabus</td><td colspan="6">• Conventional energy sources (fossil fuels, nuclear energy): raw material extraction, transport and processing, typical techniques of conventional energy generation, environmental impacts (from resource extraction to energy production).<br>• Renewable energy sources (hydropower, wind power, solar energy, and biomass): ecological advantages, challenges for implementation (cost, suitable locations, acceptance, and negative environmental impacts).<br>• Efficiency at the energy supply side (efficiency factors , energy losses during combustion, transport etc.).<br>• Efficiency of energy usage in industry, at the municipal and domestic level (e.g., heating/insulation, efficiency of electrical appliances, energy efficiency in the transportation sector).<br>• Students project: Assessment of energy efficiency at GMIT in Nalaikh</td></tr>
<tr><td>Learning outcomes</td><td colspan="6">On successful completion of this module, the students should be able to:<br>• Explain the principles of the technical construction of renewable energy systems (Energy Sources, Solar Photovoltaic, Solar Tracking, Charge Controller and Inverter, Wind Power Systems, Wind Turbine Control, Biomass Technologies, Geothermal Power Generation, Energy from Water, Fuel Cells, Generators)<br>• Describe the relevance of the energy production sector for environmental degradation and a sustainable future<br>• Critically reflect the advantages and disadvantages of different conventional and renewable energy sources and production techniques<br>• Assess the efficiency of energy production and consumption for typical examples from Mongolia (e.g. thermal power plants, insulation of buildings, transport sector)<br>• Apply knowledge about the preconditions for an effective usage of energy system</td></tr>
<tr><td>Literature</td><td colspan="6">1. Demirel, Y, Energy - Production, Conversion, Storage, Conservation, and Coupling, (Springer, 2016)<br>2. Buchla D.M., Kissel, T.E. and Floyd T.L., Renewable Energy Systems, (Pearson, 2015)</td></tr>
<tr><td>Form of teaching</td><td colspan="6">Lecture (2 UoI)<br>Recitation (1 UoI)<br>Field trip (1 UoI)</td></tr>
</table>

| | |
|---|---|
| **Assessment methods** | Written examination (90 min.) and academic performance |
| **Associated study program** | *B.Sc. Electrical Engineering- Energy*<br>*B.Sc. Environmental Engineering* |
| **Prerequisites for participation** | None |
| **Requirements for receiving credit points** | Passing the examinations |
| **Grading system** | The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%. |