



## COURSE DATASHEET

<b>Semester:</b>	2014/15/2
<b>Course:</b>	Renewable Energy Sources
<b>Code:</b>	VEMKFISV12B
<b>Responsible department:</b>	Institute of Physics and Mechatronics
<b>Department code:</b>	MKFI
<b>Responsible instructor:</b>	dr. Szabolcs Varga

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### Course objectives:

The main objective of this course is to expand the various renewable energy sources in a physicist's or engineer's viewpoint.

### Course content:

1. Introduction. Energies in nature that can build or destroy. Life and energy. Hydrocarbons (fossil fuel) and "renewable" energy sources. 2. An overview of renewables with some interesting examples: solar energy, wind power, hydropower, geothermal energy, biofuel, and nuclear energy. 3. Solar energy (1). The Sun – how is it works? The role of solar energy in the life on the Earth. Passive solar technologies (solar architecture, glass walls, Tromb 's wall). Active solar (absorbers, solar thermal collectors). 4. Solar energy (2). Photovoltaics (solar cells). Solar power plants. Future possibilities. 5. Wind power (1). The origin of the wind. Anemometers. History: sailing, windmills, wind turbines. Wind farms (planning and placing). 6. Wind power (2). Using wind energy in wind turbines, wind mills, wind pumps, etc. Pros and cons. Denmark as a model country. Possibilities in Hungary. Example: the wind turbine in Inota. 7. Hydropower (1). History: irrigation, water wheels, water mills, etc. Types of water wheels and turbines. 8. Hydropower (2). Hydroelectricity: run-of-the-river plants (e.g. Tiszaok), power plants with reservoir (e.g. Bs), pumped storage hydroelectricity (e.g. Vianden, Lux.). Small hydro (e.g. Ikervr). Bs-Gabcikovo power plant. 9. Tidal and wave power. On the origin of tides. An overview of the possible technologies. Environmental and economical pros and cons. Example: Severn, England. 10. Geothermal power (1). The origin of geothermal energy. Heat sources: hot spring, hot dry rock. Geothermal electricity. GHP 11. Geothermal power (2). Environmental impact. Water reinjection. Possibilities in Hungary (balneology, heating). 12. Biofuel. Energy derived from biomass. Solid biomass. Bioethanol, biodiesel. Biogas. Biogas powerplant. 13. Nuclear power (1). Nuclear fission, chain reaction. Types of nuclear reactors. The power plant at Paks. 14. Nuclear power (2). Pros and cons. Nuclear accidents (Chernobil). Nuclear fusion - the future?

### Requirements, evaluation and grading:

Written exam

### Required and recommended readings:



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### Required and recommended readings:

Gábor András: Környezetbarát energiaforrások, multimédiás jegyzet. [www.vein.hu/www/tanszekek/fizika](http://www.vein.hu/www/tanszekek/fizika).  
Megújuló energiák, multimédiás jegyzet, Nyíregyházi Főiskola, Környezettudományi Tanszék,  
<http://www.nyf.hu/others/html/kornyeztud/megujulo/Startpage/index.html>