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| **Óbuda University**<br>Kandó Kálmán Faculty of Electrical Engineering | Department of Microelectronics and Technology |

Name and code of subject: **Eco-engineering**, **KEWOKBABN** **Credits*:* 4**
**Full-time course, spring semester**

Course: Electrical engineering

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| Responsible: | **Dr. Ákos Nemcsics** | Lecturer: | **Dr. Ákos Nemcsics** |
| Prerequisites: | - | | |

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| Contact hours per week: | Lecture: **2** | Class discussion: 1 | Laboratory: **0** | Consultation: |
| Evaluation: | **Exam** | | | |

Subject description

Aims:
Concise but informative description of the knowledge to be acquired and skills to be developedThe subject is dealing with such technical constructions, which are environmental frendly or material saving or energy efficient. The subject is connecting with the following technological areas: renewable energy sources (such as solar energy, wind energy, water energy, bio mass usage, geothermal energy etc.), ecological architecture (passive and active solar systems, energy ballance, earth houses, smart building, smart settlements, PV house, green roof, green facade etc.), solar cell applications and combined solar systems with collector (e.g. induced ventillation). During the discussion of the abovementioned topics, we will use the results of following topics: engineering, bionics, thermodinamics, exergy analysis, self-assembling, non-linear dynamics etc. For the illustration we show some case studies from various areas

| **Lecture topics** | **Week** | **Lessons** |
|---|---|---|
| Ecological foundations, symptoms of environmental degradation | **1.** | **1** |
| Energy issues, thermal power plant, nuclear power plant operation, environmental risks | **2.** | **1** |
| Possibilities of exploiting renewable energies, passive solar energy utilization | **3.** | **1** |
| Utilization of active solar energy and exploitation of other renewable energies | **4.** | **1** |
| Properties of ecological architecture | **5.** | **1** |
| The optimal settlement size and transport issues | **6.** | **1** |
| Alternatives to environmentally friendly waste management | **7.** | **1** |
| Possibilities of recycling | **8.** | **1** |
| Special forms of environmental pollution | **9.** | **1** |
| Questions of aesthetics and expediency | **10.** | **1** |
| Constructions that can be used in technical life can be seen from the structure and operation of plants | **11.** | **1** |
| Constructions that can be used in technical life can be seen from the structure and functioning of animals | **12.** | **1** |
| Constructions that can be used in technical life can be seen from the structures built by animals | **13.** | **1** |
| written knowledge assessment | **14.** | **1** |
| **Topics in Class discussion** | | |
| Discussion about the ecological foundations, symptoms of environmental degradation | **1.** | **1** |
| Discussion about the energy issues, thermal power plant, nuclear power plant operation, environmental risks | **2.** | **1** |

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| Discussion about the possibilities of exploiting renewable energies, passive solar energy utilization | **3.** | **1** |
| Discussion about the utilization of active solar energy and exploitation of other renewable energies | **4.** | **1** |
| Discussion abouth the properties of ecological architecture and looking for typical examples | **5.** | **1** |
| Discussion about the optimal settlement size and transport issues and case studies | **6.** | **1** |
| Discussion about the alternatives to environmentally friendly waste management | **7.** | **1** |
| Discussion about the possibilities of recycling, case studies and calculations | **8.** | **1** |
| Discussions about the special forms of environmental pollution; find examples; brainstorming | **9.** | **1** |
| Discussion about the questions of aesthetics and expediency, case studies and their discussion | **10.** | **1** |
| Discussopn about constructions that can be used in technical life can be seen from the structure and operation of plants | **11.** | **1** |
| Discussion about constructions that can be used in technical life can be seen from the structure and functioning of animals | **12.** | **1** |
| Case studies and their discussion of constructions that can be used in technical life can be seen from the structures built by animals | **13.** | **1** |
| Evaluation and discussion of the written assesment | **14.** | **1** |

**Assessment and evaluation**

**Literature:**


1. H. Haken: Synergetics; Springer, (1983)
2. Luther W. Skelton: The Solar-hydrogen energy economy; Van Nostrand Reinhold; New York (1984).
3. J. Crowley, L. Z. Zimmermann: Practical Passive Solar Design; Mc Graw Hill, New York, (1983).
4. K. Falconer: Fractal geometry; John Wiley & Sons, Chichster (1993).
5. C. N. Vaughn,L. S. Kenneth: I ntroduction to Renewable Energy 2nd ed.CRC Press (2016)
6. W. Myers, P. Antonelli: Bio design; Nature + Science + Creativity; edited by Museum of modern Art (2018)