**SYLLABUS** (MODULE-ERASMUS+)

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| Course/module (as specified in the approved curriculum for the field of study)  **Materials and technologies in civil engineering** | | | | | | ECTS  **4** | | Component code  **ENVI 4.1** | |
| Name in Polish  **Materiały i technologie w budownictwie lądowym** | | | | | |
| Unit(-s) providing the course/module (Faculty, Institute/Department)  **Faculty of Environmental and Mechanical Engineering, Department of Civil Engineering and Geoengineering** | | | | | | | | | |
| Head of course/module (e-mail address)  **Anna Maria Grabiec, Prof. UPP (**[**anna.grabiec@up.poznan.pl**](mailto:anna.grabiec@up.poznan.pl)**)** | | | | | | | | | |
| Other teachers  **Wojciech Kostrzewski, MSc** | | | | | | | | | |
| Course category  **Open** | | Language  **English** | | Level  **Bachelor/Master** | Profile  **Academic-general** | | Semester  **Winter** | | |
| **TYPE OF CLASSES/LECTURES AND THE NUMBER OF HOURS**  (organised classes/lectures and self-study) | | | | | | | | | |
| Type of studies: full-time | | |  | Type of studies: extramural | | | | |  |
| * lectures | | | 35 | * lectures | | | | | - |
| * practical classes | | | 15 | * practical classes | | | | | - |
| * field exercise | | | 10 | * field exercise | | | | | - |
| * other lessons | | | - | * other lessons | | | | | - |
| * self-study | | | 40 | * self-study | | | | | - |
| Total number of hours: | | | 100 | Total number of hours: | | | | | - |
| **PRE-REQUSITES**  Basics of environmental sciences. | | | | | | | | | |
| **OBJECTIVE OF COURSE/MODULE**  Gaining knowledge of modern trends in civil engineering (including building materials and technologies in the context of scientific achievements and sustainable development). | | | | | | | | | |
| **TEACHING METHODS**  Multimedia presentations; laboratory classes; auditorium classes, field trip. Ability to use distance learning tools and techniques. | | | | | | | | | |
| **LEARNING OUTCOMES** | | | | | | | Reference  to field outcomes | | |
| Knowledge | O1: Students have extended knowledge of rational selection of materials and technologies minimizing detrimental consequences of anthropopression.  O2: Students have general knowledge of environmentally friendly cements.  O3: Students have general knowledge of new generation concretes.  O4: Students have extended knowledge of use of waste materials in civil engineering | | | | | | Not  applicable | | |
| Skills | O5: Students understand rules of sustainable development in civil engineering.  O6: Students are able to distinguish environmentally friendly building materials.  O7: Students re able to distinguish concrete types of new generations. | | | | | | Not  applicable | | |
| Social  competences | O8: Students understand the need for continuous learning and training.  O9: Students are able to cooperate and work in a team, both as leaders and members of a group.  O10: Students are able to establish priorities connected with solving defined tasks. | | | | | | Not  applicable | | |
| **METHODS TO VERIFY LEARNING OUTCOMES**  Classes activities (laboratory, auditorium, reports, multimedia presentations, discussion). Exam. | | | | | | | Outcome Reference  Numbers  O1 – O10 | | |
| **TEACHING CONTENT**  **Lectures**: Sustainable development in civil engineering – background and rules. Principles of building materials’ selection in the context of sustainability. Waste materials for civil and environmental engineering. Environmentally friendly building materials: eco-cements; additives and admixtures for concrete; ways of reduction of CO2 emission in cement and concrete industry; special concretes. Modern concrete technologies – Self-Compacting, , High-Performance, Very High-Performance, Recycled Aggregate, Architectural.  **Practical classes:** Auditorium activities – studies on source materials (literature and EU standards) connected with lecture topics regarding concrete technology. Laboratory activities on concrete technology. Practical applications of environmentally friendly material and technological solutions. | | | | | | | | | |
| **Forms and criteria for passing of course/module**  Classes activities with accepted result (participation, reports, presentations)  Exam in written form (multiple choice test) | | | | | | | Percentage of final mark  40%  60% | | |
| **LIST OF LITERATURE**   1. Neville AM., BrooksJJ. “Concrete technology”. Second Ed. Longman Group UK (2010). 2. Pacheco-Torgol F., Tam VWY., Labrincha JA., Ding Y., de Brito J. “Handbook of recycled concrete concrete and demolition waste”. First Ed. Woodhead Publish (2013). 3. Ramachandran VS., “Concrete admixture handbook”. Second Ed. William Andrew Publishing (1996). 4. The European Guidelines for Self-Compacting Concrete. BIMB, CEMBU-REAU, ERMO, EFCA, EFNARC, [www.efnarc.org](http://www.efnarc.org). (2005). 5. Current publications connected with teaching content coming from journals available at literature data bases. | | | | | | | | | |