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| Subject name | Ecology of post industrial sites and ecosystem restoration | |
| Subject code | | |
| Department | Department of Forest Ecology and Reclamation, Institute of Ecology and Silviculture | |
| Faculty | Faculty of Forestry | |
| Subject supervisor/Lecturer | Marcin Pietrzykowski, Ph.D. DSc. Associate Professor of Forest Ecology and Forest Land Reclamation rlpietrz@cyf-kr.edu.pl Phone: +48 126625302; mobile: +48 664767078 Fax: +48 124119715 Strona pracownicy UR ; Google Scholar ; LinkedIn ; Facebook | |
| General information | Teaching period | summer semester |
| | ECTS credit | 2 |
| | Lectures total | 12 |
| | Classes | 4 |
| | Field training | 14 |
| Objective and general description | The course deals with restoration concept and reclamation treatments on post-mining and post-industrial sites with special issue of reclamation to forest. The course includes landscape's development and management background; restoration ecology of post-mining sites, especially succession of forest ecosystem, plant and soil development and relationship; criterions of reclamation process assessment. Some issues of ecological engineering on post-industrial areas and biostabilization are included, as well. Most discussed topics are carried out on research developed in Department of Forest Ecology and reclamation and were presented at national and international conferences. Presented knowledge has also practical dimension, since the Department collaborates closely with mining industry and State Forestry Holding Administration. | |
| Lectures 5 × 2 hours | <ol style="list-style-type: none"> Restoration ecology, fundamental and concepts, examples; Reclamation to forest – introduction, definition, low background, reclamation treatments, post-mining areas' balance. Post-mining ecosystem – concepts and management: i) forest ecosystem development on post-mining sites: soil forming process and plant succession, reclaimed mine soil classification; succession or reclamation - a case study of forest ecosystem development, new approaches for reclamation assessment. Post-mining ecosystem – concepts and management: ii) forest ecosystem development on post-mining sites: site classification on post-mining sites for forestry; tree species response to mine sites and species selection to afforestation, tree stands' development, tree stand's nutrient supply and stability, nutrients uptake efficiency and accumulation in biomass, soil and aboveground biomass, root system strategies. Examples of reclamation strategies at different mining industry activities, geology and climatic zones - transcontinental review. Some issues of ecological engineering and risks assessment on post-mining sites: technical and biological methods for stabilization of post-mining wastes; Impact of mine sites and industrial pressure on ecosystem, mine acid water drainage, soil pollution and soil contamination around post-mining and industrial sites objects. | |
| Classes 3 × 2 hours | <ol style="list-style-type: none"> Restoration ecology, ecosystem development on post-mining sites. Ecological engineering and risks assessment on post-mining sites. | |

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| | <p>3. Ecology and reclamation on post-mining sites - review, students' presentation and discussion.</p> |
| <p>Field training Two days (2×7 hours)</p> | <p>Practical aspects of forest land reclamation and mining industry pressure on ecosystem</p> <p>visit to selected post-mining site reclaimed to forest and post-industrial sites on extremely disturbed forest ecosystem visit to selected post-mining site reclaimed to forest and post-industrial sites on extremely disturbed forest ecosystem:</p> <ul style="list-style-type: none"> • trip No 1- landscape management of mine sites, reclamation treatments, forest management on reclaimed post-mining sites, sustainability development of post-mining sites; practical course on soil-forming process and soil classification of reclaimed mine soils, biodiversity as ecological criterion of reclamation assessment; • Trip No 2 - forest ecosystem under Zinc and Lead industry's impact (characteristic of non-ferrous industry influence; soil and plant contamination, mining drainage, heavy metal impact on forest ecosystem). • |
| <p>Literature</p> | <p>Pietrzykowski M. 2014. Reclamation and Reconstruction of Terrestrial Ecosystems on Mine Sites-Ecological Effectiveness Assessment. Chapter in Series: Energy Science and Technology Series, Vol 2: Coal Energy (ed.) J.N. Govil, Studium Press LLC, Houston, p: 1 – 33.</p> <p>Barnhisel R. I., Darmody R. G., Daniels W. L., (ed.). 2000. Reclamation of drastically disturbed lands. Number 41 in the series Agronomy, Madison, Wisconsin USA Publishers</p> <p>Nathanail C. R., Bardos R. P. 2004. Reclamation of contaminated land. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, England</p> <p>Selected scientific papers (supplied by lecturer):</p> <p>Pietrzykowski M. and Krzaklewski W., 2007. Soil organic matter, C and N accumulation during natural succession and reclamation in an opencast sand quarry (southern Poland). Archives of Agronomy and Soil Science, 53 (5), 473-483. (download)</p> <p>Pietrzykowski M. and Krzaklewski W., 2007. An assessment of energy efficiency in reclamation to forest. Ecological Engineering, 30, 341-348. (download)</p> <p>Pietrzykowski, M., Daniels, W. L. 2014. Estimation of carbon sequestration by pine (Pinus sylvestris L.) ecosystems developed on reforested post-mining sites in Poland on differing mine soil substrate. Ecological Engineering, 73: 209-218. (download)</p> <p>Pietrzykowski M. 2014. Soil quality index as a tool for Scots pine (Pinus sylvestris) monoculture conversion planning on afforested, reclaimed mine land. Journal of Forestry Research. 25(1): 63-74 (download)</p> <p>Pietrzykowski M., Socha J. and N. S. van Doorn. 2014. Linking heavy metal bioavailability (Cd, Cu, Zn and Pb) in Scots pine needles to soil properties in reclaimed mine areas. Science of the Total Environment 470-471: 501-510. (download)</p> <ul style="list-style-type: none"> • |
| <p>Assessment method</p> | <p>practical course - self presentation by students, field studies - report, final note - oral exam</p> |