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| Module designation | *Soil Pollution and Rehabilitation* | |
| Module level, if applicable | *Bachelor* | |
| Code, if applicable | *PNT20192214* | |
| Subtitle, if applicable |  | |
| Courses, if applicable | 1. *Introduction* 2. *Sources of pollutants and classify the kinds of pollutants* 3. *Identify the characteristics of pollutants, especially organic compounds derived from agrochemicals* 4. *Soil interactions - contaminant factors affecting bioavailability* 5. *In-situ and non-in-situ remediation techniques, chemical* 6. *Physical and chemical soil remediation* 7. *Bioremediation* 8. *Microbial remediation* 9. *Phytoremediation* 10. *Interaction of plants and microbes in bioremediation* | |
| Semester(s) in which the module is taught | *Uneven* | |
| Person responsible for the module | *Dr. Ir. Eko Hanudin, M.S.* | |
| Lecturer | *Dr. Ir. Eko Hanudin, M.S.*  *Dr. Cahyo Wulandari, S.P., M.P.* | |
| Language | *Bahasa/Indonesian language* | |
| Relation to curriculum | *Elective* | |
| Type of teaching, contact hours | *Lecture, presentation, discussion.* | |
| Workload | *2/0 SKS or 3,02/0 ECTS* | |
| Credit points |  | |
| Requirements according to the examination regulations | *Presence must be 70% pf all meetings*  *Has to accomplished all the assignment* | |
| Recommended prerequisites | *-* | |
| Module objectives/intended learning outcomes | *Students can know and understand the concept of pollution in soil and water*  *Students can find out and identify the sources and types of pollutants*  *Students can know and understand the interaction of soil components with pollutants*  *Students are able to apply remediation technology physically, chemically, and biologically.* | |
| *Content* | 1. *Introduction* 2. *Sources of pollutants and classify the kinds of pollutants* 3. *Identify the characteristics of pollutants, especially organic compounds derived from agrochemicals* 4. *Soil interactions - contaminant factors affecting bioavailability* 5. *In-situ and non-in-situ remediation techniques, chemical* 6. *Physical and chemical soil remediation* 7. *Bioremediation* 8. *Microbial remediation* 9. *Phytoremediation* 10. *Interaction of plants and microbes in bioremediation* |
| *Study and examination*  *requirements and forms of examination* | *Assesment Presentasi/UTS/UAS* |
| *Media employed* | *Text, Presentation, Visual & Audio Web.* |
| *Reading list* | 1. *Bitton, G. 2005. Wastewater Microbiology. A John & Sons, Inc, Publ. new Jersey.* 2. *Chandy, G. R. 1995. Biological Degradation and Bioremediation of Toxic Chemicals. Timber Pass. Portland, OR.* 3. *Evan, G. M. and J. C. Furlong. 2003. Environmental Mirobiology. John Wiley & Sons, Ltd. Chichester, England.* 4. *Gaylorde, C. C. and H. A. Vodela (eds). 1995. Bioextraction and Biodeterioration of Metals. Cambridge Univ. Press. New York.* 5. *Hinchee, R. E., B. C. Alleman, R. E. Hoepel and R. N. Miller. 1994. Hydrocarbon Bioremediation. Lewis Publishers, Boca Raton.* 6. *Maier, R. M., I. L. Pepper and C. P. Garba. 2000. Environmental Microbiology. Academic Press. New York.* 7. *Mirsal, I. A. 2008. Soil Pollution Origin, Monitoring and Remediation. Springer-Verlag Berlin Heidelberg. Jerman.* 8. *Raymond A., Wuana1 and Felix E. Okieimen. 2011. Heavy Metals in Contaminated Soils: A Review of Sources, Chemistry, Risks and Best Available Strategies for Remediation. ISRN Ecology Volume 2011, Article ID 402647, 20 pages.* 9. *Journal of Environmental Sciences and Technology (*[*http://www.scialert.net/previous.php?issn=1994-7887*](http://www.scialert.net/previous.php?issn=1994-7887)*).* 10. *African Journal of Environmental Sciences and Technology (*[*http://www.academicjournals.org/journal/AJEST*](http://www.academicjournals.org/journal/AJEST)*).* 11. *Inernational Journal of Environmental Sciences and Technology (http://www.ijest.org/).* |