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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*
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| 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*
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| *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/).*
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