MODULE: Sanitary Engineering

Last Update: 18.07.2011

1	Modulname Module name	Sanitary Engineering
2	Modulkürzel Identification code	021220012
3	Leistungspunkte (LP) Credit points (CP)	6
4	Semesterwochenstunden (SWS)/Semester load	4
5	Moduldauer (Anzahl der Semester) Module duration (Number of semesters)	1
6	Turnus Cycle	every 2nd semester
7	Sprache Language	English
8	Modulverantwortliche(r) Person in charge of module	Dr.-Ing. Klaus Fischer Institut für Siedlungswasserbau, Wassergüte- und Abfallwirtschaft Tel.: 0711/685-65427, e-Mail: klaus.fischer@iswa.uni-stuttgart.de
9	Dozenten Lecturers	Dr.-Ing. Klaus Fischer, Prof. Dr.-Ing. Heidrun Steinmetz
10	Verwendbarkeit/Zuordnung zum Curriculum /Applicability/Assignment to curriculum	WASTE (M.Sc.), Core Course, B, Mandatory, 1st Semester, (WS) WAREM (M.Sc.), K, Mandatory for Section, 1st Semester, (WS) MIP (M.Sc.), B, Mandatory, 1st Semester, (WS)
11	Voraussetzungen Prerequisites	None
12	Lernziele Intended learning outcome	Solid Waste Management: The students have detailed knowledge about waste avoidance procedures in household and industry. Waste avoidance includes the ecology -oriented daily shopping, the substitution of contaminated materials in the industrial production as well as the Zero Emission Society. In the case of unavoidable waste fractions, the students acquire the competence to establish collection and transportation systems for these wastes, within the logistic, economic and legal frame. Main emphasis is given to the collection of recyclables. The students know the relevant factors which influence the waste amount and waste composition in general and in particular within the separate collection of recyclables. The students are acquainted with the state of the art of recycling technologies for separate collected paper, glass, metal and plastic including the pretreatment process. They have knowledge of the aerobic and anaerobic treatment and utilization of separate collected biowaste. (Not avoided and recycled waste has to be treated before disposing off e.g. in a landfill site.) The students possess a general knowledge of the mechanical and biological treatment technology as well as of the thermal waste

		treatment. They are able to evaluate the different treatment and recycling processes from an ecological and economic point of view. <u>Waste Water Technology:</u> The students have knowledge about the most important components of the urban drainage and the basic treatment processes of wastewater. Thus they are able to compare different systems in dependence of changing boundary conditions and assess the effectiveness and pros and cons of the systems, eg. concerning impacts on the environment, economical and operational aspects. They <u>obtain</u> an understanding for system connections between the urban drainage system and the wastewater treatment system as well as between the urban water system and the environment.
13	Inhalt Content	**Solid Waste Management:** ▪ Waste generation and waste composition ▪ National and international regulations for waste ▪ Waste avoidance ▪ Collection and transport of waste ▪ Separate collection of recyclables ▪ Sorting of recyclables ▪ Recycling technologies for paper, glass, metal, plastic ▪ Biological treatment of waste ▪ Waste Disposal ▪ Ecological indicator systems **Waste Water Technology:** Basics of urban drainage and municipal wastewater treatment ▪ Quantity and Composition of Wastewater ▪ Urban drainage systems ▪ stormwater treatment ▪ mechanical wastewater treatment ▪ biological wastewater treatment ▪ sludge treatment ▪ natural close and ECOSAN systems
14	Literatur/Lernmaterialien Literature/Learning material	Lesson Manuscripts Solid Waste Management G. Tchobanoglous et. al.: Handbook of solid waste management; Bililteski, B. et.al.: Waste Management, Springer 1994 ISBN: 3-540-59210-5 Butler, D., Davies, J.W: .Urban drainage, Spon press London, Henze, M., Harremoes, J., la Coour Jansen, J., Arvin, E: Wastewater treatment. Springer Verlag Berlin
15	Lehrveranstaltungen und Lehrformen Course units and teaching methods	Solid Waste Management, Lesson, 2 SWh Waste Water, Lesson, 2 SWh, Excursion, 16 h, 1,1 SW

<table>
<tr><td>16</td><td>Abschätzung des Arbeitsaufwands
Estimation of workload</td><td>Time of attendance: 56 h

Private Study: 108 h

<table>
<tr><th>Pos</th><th>unit</th><th>presence time</th><th>self study</th><th>project</th><th>Sum</th></tr>
<tr><td>1</td><td>Lecture Solid Waste</td><td>28,0</td><td>54,0</td><td>0,0</td><td>82,0</td></tr>
<tr><td>2</td><td>Lecture Waste Water</td><td>28,0</td><td>54,0</td><td>0,0</td><td>82,0</td></tr>
<tr><td>3</td><td>Excursion</td><td>16,0</td><td>0,0</td><td>0,0</td><td>16,0</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>180,0</td></tr>
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<tr><td rowspan="2">17a</td><td>Studienleistungen (unbenotet)
Course achievements (without mark)</td><td>Excursion:
Not graded participation (USL-V)</td></tr>
<tr><td>Studienleistungen (benotet)
Course achievements (with mark)</td><td>Keine</td></tr>
<tr><td>17b</td><td>Prüfungsleistungen (benotet)
Examination achievements (with mark)</td><td>Solid Waste Management and Waste Water Technology:
Examination: written, Time: 120 Min (PL-S)</td></tr>
<tr><td>18</td><td>Grundlage für…
Basis for…</td><td>- Urban drainage and design of Wastewater treatment plants
- Practical work in Sanitary engineering
- Industrial Wastewater</td></tr>
<tr><td>19</td><td>Medienform
Media</td><td>Presentation of fundamental instructional contents in power point,
Example calculations at the board
Exercise integrated in the lesson
Compendium to the self- instruction
Excursions for practical examples</td></tr>
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