## MODULE: Constructed wetlands for wastewater treatment

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<tbody>
<tr>
<td>1</td>
<td>Modulname Module name</td>
<td>Constructed wetlands for wastewater treatment</td>
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<tr>
<td>2</td>
<td>Modulkürzel Identification code</td>
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<td>3</td>
<td>Leistungspunkte (LP) Credit points (CP)</td>
<td>3</td>
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<td>4</td>
<td>Semesterwochenstunden (SWS)/Semester load</td>
<td>2</td>
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<td>5</td>
<td>Moduldauer (Anzahl der Semester) Module duration (Number of semesters)</td>
<td>1 Semester</td>
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<tr>
<td>6</td>
<td>Turnus Cycle</td>
<td>Shortcourse</td>
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<tr>
<td>7</td>
<td>Sprache Language</td>
<td>English</td>
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</table>
| 8 | Modulverantwortliche(r) Person in charge of module | Anne Weiss  
Universität Stuttgart  
Pfaffenwaldring 7  
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| 9 | Dozenten Lecturers | Ass. Prof. Dr.- Ing. Christos Akratos,  
Department of Environmental and Natural Resources Management  
School of Engineering  
University of Patras  
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E-Mail: cakratos@upatras.gr |
| 10 | Verwendbarkeit/Zuordnung zum Curriculum/Applicability/Assignment to curriculum | WASTE (M.Sc.), E, Elective  
WAREM (M.Sc.), E, Elective |
| 11 | Voraussetzungen Prerequisites | Chemistry and Biology for Engineers  
Sanitary Engineering |
| 12 | Lernziele Intended learning outcome | The goal of this course is to provide advanced knowledge of the processes and concepts of constructed wetlands systems to the students. They will get familiar with the existing scientific, technical, and economic practices of using constructed wetlands for wastewater and sewage sludge treatment. For this reason all late scientific developments concerning municipal industrial and agro-industrial wastewater treatment and sewage sludge treatment will be presented, At the end of the course the students will be able to:  
- Understanding constructed wetlands' main mechanisms.  
- Perform a rough design of constructed wetlands treating various wastewaters and sewage sludge |
| 13 | Inhalt Content | Basic principles of constructed wetlands  
- Attached growth treatment systems |
- Constructed wetlands (basic principles, types, vegetation, porous media, etc)
- Pollutant removal mechanisms and kinetics (organic matter, nitrogen, phosphorus, heavy metals, suspended solids)
- Sewage sludge treatment (dewatering mechanisms, mineralization processes)

### Design of constructed wetlands
- Constructed wetlands' design models (hydrodynamic and pollutant removal models)
- Determination of required constructed wetland area
- Sewage sludge treatment (sludge loading rates, duration of loading and resting periods)

### Case studies
- Municipal wastewater treatment
- Agro-industrial wastewater treatment
- Sewage sludge treatment

### Literatur/Lernmaterialien
- Kadlec, R.H., Wallace, S. Treatment wetlands, send ed. CRC Press
- Lecture notes

### Lehrveranstaltungen und Lehrformen
- Design of constructed wetlands, lecture with exercise, case studies, 2 SWS, 3LP

### Abschätzung des Arbeitsaufwands

<table>
<thead>
<tr>
<th>Po</th>
<th>Unit</th>
<th>presence time</th>
<th>self study</th>
<th>Sum</th>
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<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
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<td>Case study</td>
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### Studienleistungen (unbenotet)
- Report and presentation

### Studienleistungen (benotet)
- None

### Prüfungsleistungen (benotet)/Examination load (with mark)
- 60 min

### Medienform
- Power Point Presentations, Black Board