

## Environmental and Recycling Technology (M. Eng.)

<b>Module – Number</b>	<b>742</b>	<b>Obligatory in specialization Recycling Technology (RT)</b>		
<b>Module Name</b>	<b>Preparation of Energy Raw Materials from Waste and Recovery</b>			
Module coordinator	Prof. Dr.-Ing. Michael Rutz			
Title	Preparation of Energy Raw Materials from Waste and Recovery			
Title of examination	Preparation of Energy Raw Materials from Waste and Recovery			
Semester	2 <sup>nd</sup>			
Course type	Language	Lecture	English	
Credit hours/ ECTS/ Workload	4/0/0	5	150	
Formal Conditions	for graduates holding a Bachelor of Engineering or Bachelor of Science degree			

### 1. Content and objectives

#### Content:

Definition of "substitute fuel", "secondary fuel" or "substitute fuel".  
 Energy potentials of waste.  
 Mechanical processing of solid waste into secondary fuels or substitute fuels.  
 Function of secondary fuels or substitute fuels in industrial plants.  
 Systems for energy conversion (RDF mono power plants; biomass power plants).  
 Systems for material formation (cement works).  
 Quality assurance of secondary fuels or substitute fuels.

#### Learning objectives:

The module gives an overview of the most important waste streams for the production of substitute fuels as well as their production processes and provides the necessary system understanding in this area. The students understand the procedures and processes for the preparation and recycling of substitute fuels and can implement technical solutions in accordance with law.

Literature: For preparation and follow-up the following textbooks are recommended:

1. Worell, E.; Reuter, M. (ed.): Handbook of Recycling, Elsevier Inc., 2014.
2. Letcher, T.; Vallero, D.: Waste: a handbook of management; London, Academic Press, 2019
3. Ministry of Environment and Forrester and Climate Change, MoEFCC: Solid waste Management Rules 2016, April 8<sup>th</sup> 2016.
4. Ministry of Housing and Urban Development (MoUD), Central Public Health & Environmental Engineering Organisation (CPHEEO): Municipal Solid Waste Management Manual (MSWMM), 2016.
5. Martens, H.; Goldmann, D.: Recyclingtechnik – Fachbuch für Lehre und Praxis, 2. Auflage, Springer Vieweg 2016, ISBN 3-658-02785-1
6. Nagel, J.: Nachhaltige Verfahrenstechnik; Hanser Verlag, 2015
7. Bilitewski, B., : Abfallwirtschaft. Handbuch für die Praxis. Springer, 2013
8. Grech, H.: Ersatzbrennstoffe und das Abfallende\_Praxisleitfaden zur Umsetzung der Abfallverbrennungsverordnung; ISBN 9783854022893
9. Kranert, M.: Einführung in die Abfallwirtschaft; Vieweg und Teubner-Verlag, 2010
10. Thome-Kozmiensky, K., Beckmann, M. Grundmann, J.: Ersatzbrennstoffe, Springer-VDI-Verlag, 2002

### 2. Method(s) of instruction

Lecture

### 3. Requirements for attendance

Basic knowledge of Process Engineering and Thermodynamics.

### 4. Usability of this module

This module is obligatory in the specialization Recycling Technology and a compulsory module in the other specialization Environmental Technology.

**5. Requirements for assessment**

Students need to pass the module examination, which encompasses all contents of the lecture.  
Type of examination: written examination with a duration of 90 min. Alternative types of examination are possible.

**6. ECTS Credits**

Modules are assessed by a module examination, which is credited by 5 credit points according to the ECTS (European Credit Transfer and Accumulation System).

**7. Frequency of offer**

The module is scheduled for the first academic year.

**8. Workload**

Participation in the course = 50 h

Preparation and follow-up (of the lecture) = 55 h

Preparation for examination = 45 h

**The entire workload encompasses 150 hours, which equals 5 ECTS credit points.**

**9. Duration of module**

The module is held within one semester.