

Environmental and Recycling Technology (M. Eng.)

Module – Number	738	Obligatory in specialization Environmental Technology		
Module name	Renewable Raw Materials			
Module coordinator	Dr. Simon Eichhorn / Dr.-Ing. Anja Schreiber			
Title	Renewable Raw Materials			
Title for examination	Renewable Raw Materials			
Semester	2 nd			
Course type	Language	Lecture	English	
Credit hours/ ECTS/ Workload	4/0/0	5	150	
Formal Conditions	Bachelor of Engineering or Bachelor of Science degree			

1. Content and objectives

Content:

Various types of renewable materials

Students are given a comprehensive picture of the various types of renewable raw materials. In addition to the subdivision of renewable raw materials into divergent groups – for example wood, annual plants - the occurrence, cultivation and harvest of selected materials should also be subject of the course.

Use of renewable raw materials

Students are introduced to the various areas of application and limits of renewable raw materials. Selected products made from renewable raw materials are explained and the process engineering for their production will be examined.

The module also deals with the Kassadian modelling use of renewable raw materials and their recyclability.

Energetic utilization of renewable raw materials

Students learn about the various energetic utilization possibilities of renewable raw materials. The types of process engineering for energy generation are demonstrated.

Learning objectives:

Students acquire in-depth knowledge in renewable materials. In addition to scientific and engineering knowledges which reflect the link between renewable materials and technical implementation, historical and up-to-date engineering processes are shown especially considering the economically and ecologically feasibility. In this way the students are enabled, to recognize and evaluate application possibilities and limits of using renewable materials.

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

1. Forest Products Laboratory. 2010. Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p.
2. Wellmer, F.W.; Buchholz, P.; Gutzmer, J.; Hagelüken, C.; Herzig, P.; Littke, R.; Thauer, R.K. (2019): Raw Materials for Future Energy Supply. Springer International Publishing, 225 S.
3. Imhof P.; van der Waal J-K.; van der Waal J.C. (2013): Catalytic Process Development for Renewable Materials. Wiley VCH Verlag GmbH, Weinheim
4. Ulber, R.; Sell, D.; Hirth T. (2011): Renewable Raw Materials - New Feedstocks for the Chemical Industry. Wiley VCH Verlag GmbH, Weinheim, 230 S.
5. Deng, L.; Liu, Y.; Wang, W.: Biogas Technology. Springer Verlag, 2020, ISBN 978-981-15-4940-3
6. Jayasinghe, G. Y. ; Dassanayake, K. B.; Wijesinghe, D. T. N: Organic waste anaerobic digestion. Lambert Academic Publishing, 2015, ISBN 365-939-60-60

7. Lamb, L. J.: Anaerobic Digestion: From Biomass to Biogas. Sico Publishing, 2020, ISBN 9788269203318
8. Kaltschmitt, M.; Hartmann, H.; Hofbauer, H. (2016): Energie aus Biomasse - Grundlagen, Techniken und Verfahren. Springer Vieweg, Berlin, 2016.
9. Diepenbrock, W.: Nachwachsende Rohstoffe. Utb GmbH, 2014.

2. Method(s) of instruction

Lecture

3. Requirements for attendance

There are no formal requirements for participation.

4. Usability of this module

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