



**Tantárgy neve:
HANDLING AND PROCESSING OF BIODEGRADABLE WASTE**

**MŰSZAKI FÖLDTUDOMÁNYI KAR BSc KÉPZÉS
(nappali munkarendben)**

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

**MISKOLCI EGYETEM
MŰSZAKI FÖLDTUDOMÁNYI KAR
NYERSANYAGELŐKÉSZÍTÉSI ÉS KÖRNYEZETI ELJÁRÁSTECHNIKAI INTÉZET**

Ajánlott félév: 1.félév

Tartalomjegyzék

1. Tantárgyleírás, tárgyjegyző, óraszám, kreditérték
2. Tantárgytematika (óraóra lebontva)
3. Minta zárthelyi
4. Vizsgakérdések
5. Egyéb követelmények

1. TANTÁRGYLEÍRÁS

Course Title: Handling and Processing of Biodegradable Wastes	
Type of course: compulsory/elective	Neptun code: MFEET710006
Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: 2 lec. + 1 sem.	
Type of Assessment (exam. / pr. mark. / other): exam. During the semester the following tasks should be completed: laboratory work and report, written test. Grading Limits: > 80%: excellent, 70-79%: good, 60-69%: medium, 50-59%: satisfactory, < 50%: unsatisfactory.	
Position in Curriculum (which semester): 1st	
Pre-requisites (<i>if any</i>):	
Course Description:	
<u>Study goals:</u> To introduce the sustainable biological treatment systems for the conversion of biowastes into marketable materials or energy, or safe disposal. <u>Course content:</u> Quality and quantity biowastes according to the EU List. Microbiological and thermodynamic fundamentals of aerobic and anaerobic biodegradation. Composting processing systems, technology, equipment, quality assurance and control. Production of biogas: technological solutions, reactors, quality assurance and control, application of biogas. Technological design and dimensioning. Economics of the technologies. Innovative biotreatment of biowastes for the sake of “green chemistry”. Sustainability and environmental aspects. <u>Education method:</u> Lectures and seminars.	
The 3-5 most important compulsory, or recommended literature (textbook, book) resources:	
<ul style="list-style-type: none">• Lecture notes• Heribert Insam, Nuntavun Riddech, Susanne Klammer Microbiology of Composting. Springer Science & Business Media, 2002.• Paul T. Williams Waste Treatment and Disposal John Wiley & Sons, 2013.• Dr. W. Bidlingmaier, Dr. M. Kranert, Dr. R. Widmann, Dr. F. Scholwin. Biological waste treatment technologies. ORBIT Science, 2017	
Competencies to evolve: T4 - The environmental engineer knows the operation, and the equipments of environmental protection facilities (water, and waste water treatment plants, hazardous, and non-hazardous landfill, waste incineration plant), and the ability of their innovation. K1 – The environmental engineer is able to apply the acquired general, specific rules, contexts, processes, and principles of mathematical-, natural-, and social sciences. K2 – The environmental engineer is able to publish, and negotiate in his/her specialization, using his/her mother language, and at least one foreign language. Active professional English language skills.	

Responsible Instructor (*name, position, scientific degree*):

Ljudmilla Bokányi Dr., Associate Professor, PhD, CSc

Other Faculty Member(s) Involved in Teaching, if any (*name, position, scientific degree*):

2. TANTÁRGYTEMATIKA – schedule of lectures

1	EU Environmental and waste policy. Circular economy concept. Aerobic and anaerobic organic matter degradation paths
2	Microbiological fundamentals of bioprocessing and biodegradation
3	Basic phenomena of composting: microbiological and material transport
4	Composting 1: Temperature profile .Optimal feed . Material balance Processing systems in general
5	Composting 2: Pre-processing equipment Processing systems in details.
6	Composting 3: Processing systems in detailsl (cont). Design and dimensionong.
7	Composting 4: Capex, opex, land requirement
8	Composting 5: Quality parameters of compost. Environmental issues of composting
9	Basic phenomena of anaerobic degradation.
10	Processing of biogas: parameters, technologies and reactors
11	Usage of biogas and requiremets
12	Dimensioning of biogas facilities
13	Dry fermentation and ADA. Dimensioning of dry fermentation.
14	Innovative biotreatment of biowastes for the sake of “green chemistry”.

GYAKORLATOK – schedule of seminar

Date	Description of tasks
Week 1.	Schedule of practice lessons, subject requirements
Week 2.	University Sport Day
Week 3.	Introduction (Aerobic technological systems)
Week 4.	Calculations for static pile composting facility planning,
Week 5.	Calculations for static pile composting facility planning,
Week 6	Calculations for static pile composting facility planning
Week 7	Calculations for static pile composting facility planning
Week 8	National holiday
Week 9.	Consulting
Week 10.	Consulting
Week 11	Consulting
Week 12	Consulting
Week 13	Deadline of planning task.
Week 14	Test

3. Possible planning task

Design a complex technology based on *static pile composting*!

The quantity of dewatered sewage sludge which has to be composted is *50 000* tonnes/year. The following parameters are available:

- Solid content of sewage sludge: *35 %*,
- Volatile content of sewage sludge: *55 %*.

Choose the appropriate technology! Prepare the technological flowchart, indicate the material balance! Plan the schematic of the composting facility!

Design the leachate treatment system!

Release date: 4 October 2017

Deadline for submission: *6 December 2017*

4. VIZSGAKÉRDÉSEK – exam questions

EU Environmental and waste policy. Circular economy concept.
Aerobic and anaerobic organic matter degradation paths
Microbiological fundamentals of bioprocessing and biodegradation
Basic phenomena of composting: microbiological and material transport
Temperature profile .Optimal feed . Material balance
Processing systems in general
Pre-processing equipment
Processing systems in details.
Processing systems in detail (cont). Design and dimensioning.
Capex, opex, land requirement
Quality parameters of compost.
Environmental issues of composting
Basic phenomena of anaerobic degradation.
Processing of biogas: parameters, technologies and reactors.
Usage of biogas and requirements.
Dimensioning of biogas facilities.
Dry fermentation and ADA. Dimensioning of dry fermentation.
Innovative biotreatment of biowastes for the sake of “green chemistry”.

5. EGYÉB KÖVETELMÉNYEK - others

Using mobile phones during the test is forbidden.

Miskolc, 2018. június.10.

Dr. Nagy Sándor
mb. intézetigazgató egyetemi docens

Dr. Bokányi Ljudmilla
egyetemi docens