UNIVERSITY OF MISKOLC

FACULTY OF
EARTH AND ENVIRONMENTAL
SCIENCE AND ENGINEERING

Subject name:
HANDLING AND PROCESSING OF BIODEGRADADABLE WASTE

FACULTY OF EARTH AND ENVIRONMENTAL SCIENCES & ENGINEERING
MSc education

Course communication dossier

UNIVERSITY OF MISKOLC
FACULTY OF EARTH AND ENVIRONMENTAL SCIENCES & ENGINEERING
Institute of Raw Materials Preparation and Environmental Technology

Recommended semester: 1.

Contents

1. COURSE DESCRIPTION

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. **GradingLimits:** > 80%: excellent, 70-79%: good, 60-69%: medium, 50-59%: satisfactory, < 50%: unsatisfactory.	
Position in Curriculum (which semester): **1st**	
Pre-requisites *(if any)*:	
Course Description:	
Study goals: To introduce the sustainable biological treatment systems for the conversion of biowastes into marketable materials or energy, or safe disposal. Course content: 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. Education method: Lectures and seminars.	
The 3-5 most important compulsory, or recommended **literature** (textbook, book) **resources**:	
• Lecture notes • Heribert Insam, Nuntavun Riddech, Susanne Klammer Microbiology of Composting. Springer Science & Business Media, 2002. • Paul T. WilliamsWaste 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: ***Knowledge*** Knows and applies scientific and technical theory and practice related to the profession of environmental engineering. Knows the promotion and opinion-forming methods related to environmental engineering ***Skills*** Can apply the acquired general and specific mathematical, natural and social science principles, rules, connections and procedures in solving problems arising in the field of environmental protection. Able to conduct publications and negotiations in his/her field in his/her mother tongue and at least one foreign language.	

Able to design, implement and operate environment-focused management systems

Competence in terms of attitude

Assumes the professional and moral values related to the field of environmental protection

Shares experiences with co-workers, thus helping their development.

Competence in terms of autonomy and responsibility

Shares the acquired knowledge and experience with formal, non-formal and informal information transfer with practitioners in their field.

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. COURSE TOPICS

Course topics (WEEKLY SCHEDULE)
Actual semester:1st. semester
Environmental Engineer Msc, Waste management

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 detaisl (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”.

Seminar works:

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.
Semimartask

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. 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 requiremets.
Dimensioning of biogas facilities.
Dry fermentation and ADA. Dimensioning of dry fermentation.
Innovative biotreatment of biowastes for the sake of “green chemistry”.

.5. OTHER REQUIREMENTS

Presentation

Using mobile phones during the exam is forbidden.

Miskolc, 2023.

Dr. Sándor Nagy Head of Institute, Associate Professor	Dr. Ljudmilla Bokányi Lecturer