University of Kerala

Discipline	**BOTANY**				
Course Code	**UK4VACBOT202**				
Course Title	**BIODEGRADABLE WASTE MANAGEMENT**				
Type of Course	**VAC**				
Semester	**IV**				
Academic Level	**200-299**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	03	03 Hours	-	-	03 Hours
Pre-requisites	No Pre-requisites				
Course Summary	To provide fundamental knowledge about biodegradable waste and their management**,** analysis of problems associated with wastes and finding out solutions and to Educate people about environmental sustainability for a better future.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I		**Understanding Biodegradable Wastes**	**06**
	1	Introduction to biodegradable wastes- Definition and Significance	
	2	Source – kitchen, green, Leaf litter, food, wood, textile, biodegradable plastics.	
	3	Importance of Managing Biodegradable Wastes.	
II		**Challenges of Biodegradable Wastes Management**	**10**
	4	Inefficient waste disposal practices, Costly transportation to landfill sites, Underutilized bio-methanation potential- Pathogen detection and odour, production in composting, balancing Biodegradable Plastics and Recycling, Circular Economy Challenges, Education and Awareness, Inconsistent Regulations and Policies	
III		**Strategies, Solutions, and Importance**	**10**
	5	Composting - simple and vermicomposting, Anaerobic digestion, Landfill management, Waste-to-Energy Conversion	
	6	Segregation of waste at the source, community-based composting Promoting bio-methanation**,** Investing in eco-friendly waste processing technologies**,** Environmental sustainability, and reduction of ecological footprint	
	7	Environmental preservation, Soil enrichment, Reduced landfill burden. Energy generation: Circular economy, Health and Aesthetics:	
IV		**Technological Innovations & Future of Biodegradable Waste Management**	**10**

	8	Smart waste bins, Waste level sensors, Biogas production, Bioplastics and Biodegradable Products, Circular Economy Innovations, Edible food containers, fungi-based packaging materials, Novel Bioremediation Methods in Waste Management, bioenergy Recovery.	
	9	Biodegradable plastics and Materials- Advancements in Biodegradation Strategies, Circular Bio-economy**,** Interdisciplinary Approaches**,** Create a green, low-carbon economy**,** Organic waste valorization, Optimize resource use, Reduce reliance on non-renewable materials (such as petroleum and minerals)- Facilitate energy-efficient conversion.	
V	**Rules & Global Initiatives**		**09**
	10	The Solid Waste Management Rules 2016	
	11	Learning from Biodegradable Waste Management Practices National and Worldwide- The Netherlands: Organic Waste Conversion, South Korea: Mandatory Food Waste Recycling	
	12	UNEP Global waste management - Bio-economy	

Suggested Reading

1. Joseph,B. 2005. Environmental studies. Tata McGraw Hill Co.Ltd.
2. Debra,R.Reinhart, Timothy G. Townsend. Landfill Bioreactor Design and Operation. Lewis Publishers,Boca Raton, NewYork
3. Glynn Henry and Gary W.Henke.2004. Environmental Science and Engineering. Prentice Hall of India Pvt Ltd.
4. Purohit,S.S. Q.J.Shammi and A.K.Agarwal. 2004.A text book of Environmental Sciences. Saraswathi Purohit for Student Edition, Jodhpur.
5. Nath,K.J. 1984. Metropolitan solid waste management in India. In: Holmes JR, editor, Managing solid waste in developing countries. NewYork. John Willey and Sons.pp304
6. Ramachandra,T.V. 2006. Management of Municipal solid waste. Capital Publishing Company.

Web link

1. https://swachcoop.com/pdf/CAG%20Audit.pdf

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Students gain knowledge about the concept of bio-degradability and the types of waste that fall under this category.	R, U	
CO-2	Students are able to Identify the challenges in biodegradable waste disposal and analyze different methods to overcome it.	U,An,	PSO-4,5

CO-3	Students explore the latest advancements in innovative technologies and apply them in the future	U,Ap,E	PSO-7,8
CO-4	Distinguish the role of various national and internal acts and laws applicable to biodegradable waste management and handling.	R,U,	

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Biodegradable waste management

Credits: 3:0:0 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	1		U,R	F,C	L,T	
2	2	4,5	U,An,	F,C	L,T	
3	3	7,8	U,Ap,E	F,C,P	L,T	P
4	4		R,U,	F,C	L,T	

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2		✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓	✓	✓