Course No:	**Course Name:** Waste Management				**Course Code:**		
Batch: 2021-2023	**Programme:** M.Sc. Environmental Sciences	**Semester:** II	**L** 2	**T** 0	**P** 0	**Credits** 2	**Contact Hrs. per Week:** **2** **Total Hrs.:** **30**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35**Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic knowledge of environment and household goods. Basic understanding of the environment and sustainable techniques.					
Course Objectives	*To provide the basic knowledge of waste management and involve Chemistry and its associated applications.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of biodegradable solid waste **CO2**: Basic understanding of hospital and pharmacutical waste **CO3**: Basic understanding of non-biodegradable solid waste **CO4**: Skills for developing sustainable methods **CO5**: Development of the skill of the management plans **CO6**: Skill development towards hybrid methods						
Attendance Requirement:	Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.						
Evaluation Criteria:	**1.** Mid Term Examination: 25% **2.** End Term Examination: 50% **3.** Continuous Internal Assessment : 25% (Breakup is following) a. Assignment/Quiz/Term Paper: 20% b. Presentation/Seminar/Field work: 20% c. Practical: 60						
COURSE SYLLABUS							
NOTE: **i**)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks. **ii**) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.							

Unit No.	Contents	Contact Hrs.
I	**BIODEGRADABLE SOLID WASTE** **[Course Outcome (s) No. : 1 and 5]** Biodegradable solid waste: Chemical composition and classification: Source and generation: Health hazards: Management Techniques	7
II	**NON-BIODEGRADABLE SOLID WASTE** **[Course Outcome (s) No. : 2 and 5]** Non-Biodegradable Solid waste: Sources, generation, chemical composition, classification of plastic waste and its management: Sources, generation, chemical composition, classification of e-waste and its management.	8
III	**HOSPITAL AND PHARMACEUTICAL WASTE** **[Course Outcome (s) No. : 3** and **5]** Hospital and Pharmaceutical Waste: Classification: Source and generation: Health hazards: Management Techniques	8
IV	**WASTE MINIMIZATION TECHNOLOGIES** **[Course Outcome (s) No. : 4 and 6]** Waste minimization technologies: Reuse/ recycling of different types of waste: Metal recovery from waste using chemical, biological and hybrid techniques.	7

Suggested Readings:

1. D. Pant, D. Joshi, M. K. Upreti and R. K. Kotnala, Chemical and Biological Extraction of Metals Present in E Waste: A Hybrid Technology, Waste Management, Elsevier Science, Vol. 32, pg. 979-990, 2012.
2. D. Pant, R. Singh, S. Kumar, Management of Waste Poly Vinyl Chloride (PVC) through Chemical Modification, ScInd Res., Vol. 71, pg. 181-186, 2012.
3. D. Pant, Waste Management in Small Hospitals Trouble for Environment, Environmental Monitoring and Assessment, Springer, 2011.
4. D. Pant, Pharmaceutical Waste Management, Lambart Academic, 2011.
5. D. Pant, Electronic Waste Management Lambart Academic Publishing, 2010.
6. Frank Kreith, Handbook of Solid Waste Management, McGraw-Hill, Inc., New Delhi, 1994.
7. M. Roy III. Harrison, Pollution; Causes, Effects and Control. The Royal Society of Chemistry, Cambridge, 1994.
8. John R. Holmes, Practical Waste Management, John Wiley & Sons, New York/Singapore, 1983.