

Recycling Technology Syllabus



DEPARTMENT OF APPLIED COMPUTING AND ENGINEERING
TECHNOLOGY ENERGY TECHNOLOGY PROGRAM

COURSE INFORMATION

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| Credits | 4 |
| Corequisite | OSHA 10 |

DESCRIPTION

Provides an overview of recycling opportunities at both the residential and industrial scale. Prepares the student to work with a variety of materials including cellulosic, plastic, metal, glass and electronics waste. Students will be exposed to ANSI-IREC standards as well as LEED standards for repurposing and “upcycling” materials. Local home and industry tours, and hands on exposure to materials processors such as glass pulverizer, cardboard grinders and plastics extruders will be part of the course. Study of efficiency techniques used for reduction of virgin material consumption and waste management, including materials auditing and accessing international materials reclamation will be included. Career opportunities in a variety of industries related to materials reclamation will be discussed. Possible projects include the building of a solar thermal forge, reclaiming e-waste, curbside pickup with bicycles on behalf of I.E. Recycling, editing chapters for forthcoming textbook, repurposing glass bottles for rainwater catchment, repurposing flexible plastic packaging for CO₂ capture and biomass production, suburban composting courses, re-writing UMontana’s waste policy to eliminate garbage, volunteering during Adams Center events to eliminate waste, investigating the EPA’s boiler and incinerator standards, developing other biomimicry and rainforest strategies to eliminate the concept of trash.

OVERVIEW

Reducing energy consumption through efficient use of materials can have immediate effects on the operational energy costs and environmental impacts of homes and commercial buildings. Creating a more diverse post-consumer waste stream is one way to not only add jobs to the economy, but to obviate the need for landfills. With rising energy and materials supply costs and growing concerns surrounding global climate change, professional opportunities in recycling technology are expected to grow dramatically in the future.



COURSE OBJECTIVES

At the completion of this course students should be able to:

- 1) Communicate the potential of recycling technology to impact the nation's energy future, especially as it applies to climate change.
- 2) Describe the objectives and general framework of the ANSI and or IREC standards for recycling.
- 3) Become familiar with basic triage methods for post-consumer waste.
- 4) Gain hands-on experience with industrial scale materials processing equipment.
- 5) Work at the community scale to understand barriers to responsible waste management.
- 6) Explain the energy and financial economics of recycling technology.

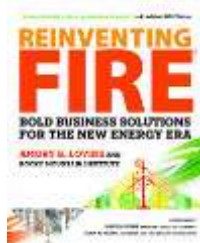
REQUIRED TEXTS/MATERIALS



1. *Cradle to Cradle: Remaking the Way We Make Things* by Micheal Braungart and William McDonough, Published by Saturn Resource Management, 2013 (www.srmi.biz). This book is now in its 6th Edition. The majority of the readings for the course will come from this text.

OPTIONAL TEXTS/MATERIALS

1. *Reinventing Fire* by Amory Lovins
2. *Off on our Own* by Ted Carns



REQUIRED LABORATORY SUPPLIES

For your laboratory experiments, you must have completed OSHA 10, have hearing, eye and hand protection.

COMPUTER HARDWARE AND SOFTWARE

The information for this course is presented in several formats. The student must be able to open and read Microsoft Word as well as PDF files. Numerous web site references will be used. Since several of the documents that will be used in this course are relatively large PDF files, ***the speed of your computer and of your Internet access will impact your online experience.*** If you have problems accessing course material, your browser may very well be the culprit. Because I will need to reset Test and Quiz access, please contact me directly if you have a technical problem while taking a Quiz or Test (See the Technical Glitches section under the Assessment/Grading Policies heading below for details). UM online Tech Support can be reached from the "Tech Support" tab in the Main Menu on Blackboard, or by calling 243-HELP (4357).



ASSESSMENT/GRADING POLICIES

There will be 13 Learning Unit Quizzes worth 1/4 of your final grade. There will be one Special Assignment or Field Experiment worth 1/4th of your grade. Discussion Board Forum posts will be required in some Learning Units, but not all. There will be two exams each worth 1/4 of your final grade. All Learning Unit Quizzes, the Mid-term and the Final Exam will be open book. Learning Unit Quiz questions will come from the PDF lecture and/or the assigned readings from that Learning Unit. Mid-term and Final Exams will consist of roughly 70 multiple choice or true/false questions. You will only be able to access Quizzes and Exams once, so once you start a Quiz or Exam, you must complete and submit it. It is possible and acceptable to have access to course materials contained in the Learning Units while taking Exams and Quizzes. This is best achieved by opening additional browser windows and navigating between browser windows to find relevant materials **without closing the Exam or Quiz window**.

Approximate grade distribution will be as follows: 90-100%=A, 80-90%=B, 70-80%=C, 60-70%=D, below 60% will be an F.

GRADING SUMMARY

25%- Learning Unit Quizzes
12.5%- Special Assignment
12.5%- Experimental write-up
25%- Mid-Term Exam
25%- Final Exam

LATE WORK

Late assignments and missed Quizzes or Exams will receive a score of zero. If you have an extenuating circumstance that will prohibit you from meeting a deadline, please contact me well in advance of the deadline and I will make reasonable accommodations.

TECHNICAL GLITCHES

If you encounter a technical problem that prohibits you from completing a Quiz or Test, please e-mail me immediately with details of the problem. We will work with Technical Support to resolve the problem as expeditiously as possible. You will not be penalized in any way for technical problems with Moodle, or technical failings that the fault of the instructor.

HOMEWORK

The weekly Learning Unit contents will be made available at 8 AM (Mountain Time) on the Monday of that week's Learning Unit. Quizzes will be available from within each Learning Unit. You are to complete the Quiz and click on the "Submit" button by 11:55 PM (Mountain Time) on the Sunday of the week in which that Learning Unit is scheduled. Correct Quiz answers will be posted within that Learning Unit on the following Monday. **P/NP option:** A student must earn the equivalent of a letter grade of A, B, or C for a P. **Online support** may be obtained via courseware-support@umontana.edu or x4999





TOPICAL OUTLINE

Each Learning Unit will include a summary of the week's assignments and a PowerPoint "lecture" that has been converted to a PDF (for compatibility reasons). Assigned readings will be in the text book, PDF files imbedded in the learning unit, and in documents available on the Internet. The length of the PDF lecture will vary depending on how well that topic is covered by the textbook and supplemental reading sources. There are thirteen Learning Units. There will be no Learning Unit the week of the Mid-term Exam.

Weekly Topic Outline

- Week 1: LU#1-Class Introductions
- Week 2: LU#2-Introduction to Recycling Technology
- Week 3: LU#3-Embodied Energy
- Week 4: LU#4- Landfill practices
- Week 5: LU#5- Glass
- Week 6: LU#6- Cellulosic Materials
- Week 7: LU#7- Metals I
- Week 8: LU#8- Metals II
- Week 9: *Mid-term Week*
- Week 10: LU#9- Plastics
- Week 11: LU#10-Organic Waste
- Week 12: LU#11- Electronic Waste
- Week 13: LU#12- HAZMATs
- Week 14: LU#13- Towards a Solar Forge
- Week 15: *Finals Week*

DISABILITY ACCOMMODATIONS POLICY

Students with disabilities may request reasonable modifications by contacting me. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. "Reasonable" means the University permits no fundamental alterations of academic standards or retroactive modifications.

