



Hazardous Materials

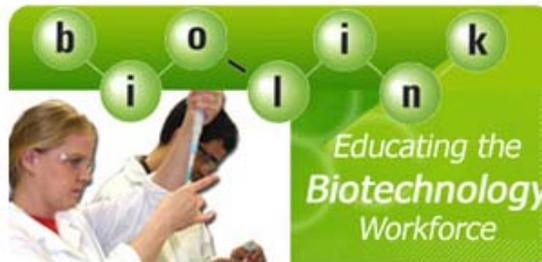
Week-by-Week Schedule

This class is designed to meet 4 hours/week for a 6-week term

This schedule is organized in modules with approximate times for each activity indicated.

Submitted by Madison Area Technical College

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DESCRIPTION: The Biotechnology Laboratory Technician Program at Madison Area Technical College requires an entire course on handling of hazardous materials. This course covers risk assessment, the classes and hazards of various chemicals, choosing proper protective equipment and chemically compatible supplies, disposal and emergency response. Within the context of this course, we introduce the safe handling of radioisotopes. Biological hazards are treated in a separate course.

STUDENTS DEVELOP THE FOLLOWING TRANSFERABLE COMPETENCIES THROUGHOUT THE ENTIRE COURSE:

- Proper laboratory notebook documentation
- Laboratory report writing

Competencies specific to a particular topic are shown in the weekly schedule that follows. Assignments not completed in class are in blue. No due dates/days are provided; you may set them as you need.

***Additional resources are available on the Additional materials page. These resources are free but log-in is required.**

Module 1: Introduction to Workplace Safety				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	<i>10 minutes</i>	Review syllabus	Hazardous Materials Syllabus	Students will: <ul style="list-style-type: none"> • Develop a safety mindset • Perform a simple risk assessment • Model good laboratory report format and content • Discuss, in depth, the format and content of laboratory report introduction sections • Complete a personal safety hygiene contract • Summarize the purview of both OSHA and the CDC
	<i>Max 45 minutes</i>	Complete risk assessment	Risk Assessment in-class group activity Or Classroom activity 1: Performing a risk assessment (Seidman et. al.)	
	<i>20 minutes</i>	Discuss lab report writing	Writing Effective lab reports	
	<i>30 minutes</i>	Prepare for Solutions lab and create flowchart Fill in Intro worksheets	Laboratory: Examining the ways chemical contamination is spread Or Laboratory Exercise 1: Tracking the spread of chemical contamination (Seidman et. al.) In-class activity: Writing introduction to laboratory reports	
	<i>15 minutes</i>	Review intro worksheets in class	In-class activity: Writing introduction to laboratory reports	
	<i>Homework and turn in at beginning of</i>	Complete personal hygiene safety	Safety contract	

	<i>next class</i>	contract	
2	<i>30 minutes</i>	View PowerPoint lecture	"Introduction to Workplace Safety" PowerPoint lecture PowerPoint lecture with Notes
	<i>30 minutes</i>	View video: "Can't Take No More" 1980 OSHA video	https://youtu.be/13gzGkQtVzg embed code: <iframe width="420" height="315" src="https://www.youtube.com/embed/13gzGkQtVzg" frameborder="0" allowfullscreen></iframe>
	<i>60 minutes and complete as Homework</i>	Complete CDC/OSHA activity	In-class activity: Exploring the CDC and OSHA website Or Classroom activity 2: Exploring safety-related government websites

Module 2: Working with Hazardous Chemicals				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	20 minutes	Emergency equipment exercise	Classroom Activity: Locating Emergency Equipment in the Laboratory Or Classroom activity 3: Responding to Emergencies (Seidman et. al.)	Students will: <ul style="list-style-type: none"> • Identify the safety equipment available in the laboratory • Complete Laboratory Exercise: Tracking the spread of chemical contamination • Model good laboratory report introduction format and content • Discuss, in depth, the format and content of laboratory notebook entries • Practice using Safety Data Sheets to safely plan laboratory exercises • Introduce the concept of chemical incompatibility with regard to equipment and supplies • Explore proper fume hood usage
	10 minutes	Lab notebook discussion	Lab notebook grading rubric And/Or Laboratory Exercise 3: Keeping a Laboratory Notebook (Seidman et. al.)	
	1 hour and 30 minutes	Complete Laboratory Exercise 1 through solution preparation; store for next period	Laboratory: Examining the ways chemical contamination is spread Or Laboratory Exercise 1: Tracking the spread of chemical contamination (Seidman et. al.)	
	At home	Activity: Understanding the chemicals with which you work	Classroom Activity 4: Understanding the chemicals with which you work (Seidman et. al.)	

	<i>At home</i>	Lab report writing: Write up an introduction and post to discussion board by end of week	Discussion board prompt (posting) Laboratory report grading rubric
	<i>At home</i>	Comment on intros of two other students by beginning of class next week	Discussion board prompt (reflection)
	<i>At home</i>	View video:	Labconco Fume Hood Airflow and Operation https://youtu.be/q2Pp3wge2j8 Embed code: <iframe width="420" height="315" src="https://www.youtube.com/embed/q2Pp3wge2j8" frameborder="0" allowfullscreen></iframe>
2	<i>45 minutes</i>	Lecture on PPE and routes of chemical exposure	"Working with Hazardous Chemicals" PowerPoint lecture and notes
	<i>75 minutes</i>	Complete Laboratory Exercise 1 Set up Lab ex. 29, part A as demo	Laboratory: Examining the ways chemical contamination is spread Or Laboratory Exercise 1: Tracking the spread of chemical contamination DEMO: Laboratory Exercise 29 (Part A): Check your test tubes to see if they are resistant to ethyl acetate

Module 3: Handling and Storage of Hazardous Chemicals				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	30 minutes	Go over discussion worksheet	In-class activity: Writing laboratory report discussion sections	Students will: <ul style="list-style-type: none"> • Model good laboratory report discussion format and content • Discuss the proper handling and storage of hazardous chemicals • Examine the NFPA Hazard Diamond System of labeling • Emphasize the process of risk reduction when planning laboratory work • Practice researching hazards and reducing risk in a laboratory procedure • Write drafts of materials and methods sections and results sections of laboratory reports • Write a draft of a discussion section and reflect on other students' work
	60 minutes	Lecture on handling and storage of hazardous chemicals	“Handling and Storage of Hazardous Chemicals” PowerPoint lecture and notes	
	30 home	View video on handling and storage of hazardous chemicals	“The Chem Lab: Safety in Every Step” Films for Humanities Video or Similar video presentation discussing risk management	
2	Up to 2 hours	Complete classroom activity 6 as a quiz	Lab Safety Activity Or Classroom Activity 6:	

			Analyzing safety issues in a laboratory procedure (Seidman et. al.)	
	<i>At home</i>	Work on lab report methods section	A checklist to avoid common errors in writing materials and methods sections of laboratory reports	
	<i>At home</i>	Write results section	A checklist to avoid common errors in writing results sections of laboratory reports	
	<i>At home</i>	Complete draft of discussion section Post to discussion board	Discussion board prompt Discussion board rubric	

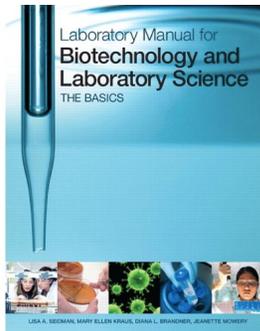
Module 4: Emergency Response				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	40 minutes	Lecture on Emergency Response	"Emergency Response Plans" PowerPoint lecture and notes	Students will: <ul style="list-style-type: none"> • Discuss proper response to emergency situations • Discuss the proper use of fire extinguishers • Use safety information resources to learn about the hazards of chemicals • Use laboratory tests to help identify chemicals • Use safety information to determine proper disposal methods for hazardous chemicals
	15 minutes	Video on fires	"Fire extinguisher training video" https://youtu.be/QK5dMp43NJE Embed code: <iframe width="560" height="315" src="https://www.youtube.com/embed/QK5dMp43NJE" frameborder="0" allowfullscreen></iframe>	
	1 hour	Prepare for mystery substances lab	"Classification of Mystery Substances" handout SDS sheets Flinn Mystery Substance Identification: The Identification of Unlabeled Laboratory Chemicals Found on School Premises http://www.flinnsci.com/media/755029/mystery.pdf	
2	Up to 2 hours	Complete mystery substances lab	"Classification of Mystery Substances" handout SDS sheets Flinn Mystery Substance Identification: The Identification of Unlabeled Laboratory Chemicals Found on School Premises http://www.flinnsci.com/media/755029/mystery.pdf	

Module 5: Working with Radioisotopes (part one)				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	1 hour	Isotopes lecture 1	"Introduction to Radioisotopes: Measurements and Biological Effects" PowerPoint lecture and notes	Students will: <ul style="list-style-type: none"> • Discuss types of ionizing radiation • Discuss hazards posed by working with radioactivity in the laboratory • Practice half-life calculations • Discover the biological effects of radiation exposure • Learn how radiation doses are measured • "Visualize" radioactive particle emission using the cloud chamber • Learn how time, distance and shielding are employed to protective radiation workers • Practice half-life calculations
	20 minutes	Work on case studies	"Radiation Safety Case Study Assessments" and key	
	40 minutes	Cloud chamber lab	Cloud Chamber (Carolina Biological Supply: #759240) Video: "Cloud Chamber to Observe Radioactivity" https://youtu.be/chxv5G6UF10 Embed code: <iframe width="420" height="315" src="https://www.youtube.com/embed/chxv5G6UF10" frameborder="0" allowfullscreen></iframe>	
2	1 hour	Isotopes lecture 2	Working with Radioisotopes: Reducing the Risk" PowerPoint lecture and notes	
	1 hour	Review half-life calculations Complete half-life calculations	"Radiation Safety Half-Life Calculations" and Key	
	At home	Complete laboratory report for submission		

Module 6: Working with Radioisotopes (part two)				
Class period (2 hour blocks)	Time required	Activity	Materials needed	Competencies addressed
1	2 hours	Complete time, distance shielding lab	Laboratory: "The Effects of Time, Distance and Shielding on Radiation Exposure" Worksheet: "The Effects of Time, Distance and Shielding on Radiation Exposure"	Students will: <ul style="list-style-type: none"> • Examine the effects of time, distance and shielding on radiation exposure • Discuss the inverse square law • Complete final assessment
	Turn in	Lab report Lab notebook	Lab report rubric Lab notebook rubric	
2	As needed	Final exam	Final exam: HazMat and Radioisotopes Final exam keys	

ADDITIONAL NOTES

1. **ADDITIONAL SUPPLEMENTAL MATERIALS RELATED TO SAFE HANDLING OF BIOHAZARDS ARE AVAILABLE WITHIN THIS COURSE-IN-A-BOX**
2. **APPROXIMATE TIMES ARE GIVEN FOR EACH ACTIVITY SO THAT YOU MAY PICK AND CHOOSE AS NEEDED TO MEET YOUR OWN EDUCATIONAL NEEDS**
3. **A TEACHERS' GUIDE PROVIDES SOME BACKGROUND INTO HOW WE USE THESE MATERIALS AND WHAT WE EMPHASIZE**
4. **TEXTBOOKS.**



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