UT Physics Teaching Assistants
Training and Review Session

by
Dr. James E. Parks
Director of Undergraduate Laboratories

Department of Physics
Nielsen Physics Building
The University of Tennessee, Knoxville
Knoxville, Tennessee 37996-1200

Fall 2013
GTA Training Sessions

- Topics
  - Lab Experiments
  - Recitation and Teaching Strategies
  - Attitudes and Professional Conduct
  - Laboratory Safety
    - Chemical, Electrical, Fire, Radiation, Hazardous Waste
  - Sexual Harassment
  - General Procedures
  - Etc.
Thursday, 8/8/13, 9:00-12:00

- Welcome & Introductions
- UT Physics & Astronomy Lab Structure
- Recitation Guidelines & Policy
- General Laboratory Safety/Radiation Safety
- Chemical Safety/Hazardous Waste
- Lab Goals/Sexual Harassment
Thursday, 8/8/13, 1:30-5:00

- Laboratory Exercises--James Parks
  ---Paul Thompson Mentoring
  ---Data Studio/Capstone Software
  ---Excel Use & First Four Exps.
  ---Air Track Exper.--Rm 508
  ---Electric Fields Exp.--Rm 510
  ---Accel. Due to Gravity--Rm 508
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  ---Accel. Due to Gravity--Rm 508
Friday, 8/9/13, 9:00-12:00

- Teaching Fundamentals--Soren Sorensen

- Grading Strategies--Norman Mannella

  ---Critical Thinking
  ---Grading Strategies
Friday, 8/9/13, 1:30-5:00

- Instructional Technology—Dr. Breinig
  ---Clickers
  ---Blackboard Technology
  ---GTA/Instructor Access Procedures
  ---Entering Lab Grades in Blackboard

- Studio Physics—Dr. Breinig
Monday, 8/12/13, 9:00-12:00

- Tennessee Learning Center--Taimi Olsen

- Peer Instruction--Kate Grzywacz-Jones

- Uniform Standard Syllabus--Christine Nattrass
Monday, 8/8/13, 1:30-5:00

- Laboratory Exercises--James Parks
  ---Ohm's Law Experiments
  ---Oscilloscope Experiment
  ---Heat of Fusion Experiment
  ---Mech. Equivalent of Heat
  ---Electric Energy Experiment
Tuesday, 8/8/13, 1:30-5:00

- Laboratory Exercises--James Parks
  - e/m Experiment
  - Ampere's Law Experiment
  - Photoelectric Effect
  - Radioactive Halflife and Radiation Exp.
  - Balmer Series Spectrometer Adj.
LABORATORY INSTRUCTION
Laboratory Courses

- Physics 135 & 136
  - Introduction to Physics for Physical Science & Mathematics Majors
  - Primarily taught by Dr. Elston by Studio Physics Method in Nielsen Room 207
  - Calculus Based
  - Integrated lectures, labs, and activities
  - 45 students per section with 2 TAs
Laboratory Courses

- **Physics 137 & 138**
  - Honors: Fundamentals of Physics for Physics Majors
  - Taught by Dr. Levin
  - Mostly traditional lectures with traditional 2 hour labs and 1 hour recitations
  - About 20 students
Laboratory Courses

- **Physics 221**
  - Elements of Physics
    - Mechanics, Heat, Wave Motion, and Optics
  - For Life Science Majors
  - Required for Pre-Med, Pre-Dental, Pre-Pharmacy, and Pre-Vet Majors
Laboratory Courses

- Physics 221 (cont’d)
  - P221 Taught by Drs. Efremenko & Handler
    - Mostly traditional lectures with traditional 2 hour labs and 1 hour recitations
  - Many Sections with about 20 students/section
  - Recitation meets the hour before the 2-hour lab
Laboratory Courses

- **Physics 222**
  - Elements of Physics
    - Electricity, Magnetism, and Modern Physics
  - For Life Science Majors
  - Required for Pre-Med, Pre-Dental, Pre-Pharmacy, and Pre-Vet Majors
Laboratory Courses

- Physics 222 (cont’d)
  - P222 Taught by Dr. Breinig & Dr. Nattrass
  - Taught as a Hybrid of Traditional Lectures, Studio Physics, and Web based Methods in Nielsen Room 207
  - Integrated mini lectures, labs, and activities
  - 5 sections with 45 students per section with 2 Tas in 3 hour blocks of time.
Laboratory Courses

- **Physics 231**
  - Fundamentals of Physics: Electricity and Magnetism
  - Primarily for Engineering Students
  - P231 Taught by Drs. Handler & Dr. Daunt
  - Mostly traditional lectures with traditional 2 hour labs only
Laboratory Courses

- Physics 231 (cont’d)
  - Many Sections with about 20 students/section
**Laboratory Courses**

- **Physics 232**
  - Fundamentals of Physics: Wave Motion, Optics, and Modern Physics
  - Primarily for Engineering Students
  - P232 taught by Dr. Zhou
  - Mostly traditional lectures with traditional 2 hour labs only
  - Several sections with about 20 students/section
Laboratory Courses

- Astronomy 153—Laboratory for Astronomy 151
  - A Journey through the Solar System with Laboratory
  - General Education Course to help fulfill Science Requirements
  - Minimal Math Required
  - A151 Taught by Dr. Daunt and Dr. Grzywacz-Jones
Laboratory Courses

- Astronomy 161 (cont’d)
  - Traditional lectures with traditional 2 hour labs
  - Several sections with about 20 students/section
Laboratory Courses

- **Astronomy 154**—Laboratory for Astronomy 152
  - Stars, Galaxies, and Cosmology with Laboratory
  - General Education Course to help fulfill Science Requirements
  - Minimal Math Required
  - A152 Taught by Dr. Daunt
Laboratory Courses

- Astronomy 162 (cont’d)
  - Traditional lectures with traditional 2 hour labs
  - Several sections with about 20 students/section
The Laboratory Manual

- Contemporary Introductory Physics Experiments
  - For use in Physics 221, 231, and 232 courses
- Errors and suggestions need to be reported
Laboratory Instruction
References
References

- Department Home Page
  - http://www.phys.utk.edu/

- Labs and Demos
  - http://www.phys.utk.edu/physlabs.html

- Teaching Assistants' Manual

- TA Laboratory Set-Up Manual
Teaching Assistants' Manual
Teaching Assistants' Manual

Table of Contents

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This manual includes physics department policies for teaching recitation sections and laboratory sections. These policies have been written by the Director of Undergraduate Laboratories in consultation with members of the physics faculty.
Labs and Demos Web Page

- Fall 2013 Astronomy & Physics Lab Schedules
  - Fall 2013 Schedule for Physics Laboratory Room 207
  - Fall 2013 Schedule for Physics Laboratory Room 507
  - Fall 2013 Schedule for Physics Laboratory Room 508
  - Fall 2013 Schedule for Physics Laboratory Room 510
  - Fall 2013 Composite Lab Schedule
  - Fall 2013 Physics 137 Schedule of Experiments
  - Fall 2013 Physics 221 Schedule of Experiments
  - Fall 2013 Physics 231 Schedule of Experiments
  - Fall 2013 Physics 232 Schedule of Experiments
Labs and Demos Web Page

- **Other Information**
  - Laboratory Policy Regarding Repeating a Course
  - TA Laboratory Set-Up Manual
  - Guidelines for Laboratory Set-Up Assistants
  - Teaching Assistants' Manual
  - TA Summer Employment Policy (.pdf)
Syllabi

- Laboratory syllabi for each course will be formulated by the lecturers for that course and the GTAs assigned to teach the laboratory sections.
- A workshop session will be held on Monday morning, August 12, 2013 at 11:00.
- GTAs should submit syllabi to Catherine Longmire to post on our Web site.
What This Meeting is About

- Improving the quality of laboratory instruction
  - The KASH Formula
    - K: Knowledge
    - A: Attitude
    - S: Skills
    - H: Habits
What This Meeting is About

- Promoting scholarship and academic excellence in physics
- Training
- Working to better satisfy accreditation requirements
Review of Professional Conduct

- The Golden Rule:
  - Treat students the way you would like to be treated
  - Be on time, be courteous, be understanding, be forgiving
  - I’ve never been sorry for being lenient
Review of Professional Conduct

- **The Business Rule:**
  - The customer is always right—
    not a fact, but an attitude
  - Don’t cheat students: provide them the education they are paying for
  - Office hours—maintain, be available
Review of Professional Conduct

- The Boy Scout Motto
  - "Be Prepared"
  - Complete every experiment before class
Review of Professional Conduct

- **Sexual harassment**
  - Don’t do it!
  - Be aware of your behavior and attitude toward and treatment of others
Training and Review Session

Outline

- Recitation procedures and guidelines
- Laboratory objectives and goals
  - Students’ expectations
  - Perceptions and reality
- The laboratory manual
- The laboratory report
- Attendance and laboratory make-ups
Training and Review Session Outline (cont’d)

- Laboratory apparatus
  - Take Ownership in the Operation of the Labs
  - Normal use and care
  - Maintenance and repair
  - Procedures for reporting needs
  - Computers and data acquisition issues
Training and Review Session Outline (cont’d)

- Laboratory safety and security
- Special considerations for the physically impaired
- Reviews of selected experiments
- Proctoring and grading procedures
- Miscellaneous items (astronomy labs, etc.)
- TA feedback on all subjects
Recitation Procedures and Guidelines

- Survey of current status and experience
- Grading procedures
- Attendance requirements
LABORATORY GOALS
Introductory Physics Laboratory Goals

From:
Experimental Laboratory Physics

“The principle of science, the definition almost, is the following: The test of all knowledge is experiment. Experiment is the sole judge of scientific ‘truth.’ But what is the source of knowledge? Where do the laws that are to be tested come from? Experiment, itself, helps to produce these laws, in the sense that it gives us hints. But also needed is imagination to create from these hints the great generalizations -- to guess at the wonderful, simple, but very strange patterns beneath them all, and then to experiment to check again whether we made the right guess.”

--Richard Feynman
I. The Art of Experimentation

The introductory laboratory should engage each student in significant experiences with experimental processes, including some experience designing investigations.
II. Experimental and Analysis Skills

The laboratory should help the student develop a broad array of basic skills and tools of experimental physics and data analysis.
III. Conceptual Learning

The laboratory should help students master basic physics concepts.
IV. Understanding the Basis of Knowledge in Physics

The laboratory should help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
V. Developing Collaborative Learning Skills

The laboratory should help students develop collaborative learning skills that are vital to success in many lifelong endeavors.
Laboratory Objectives and Goals: Introduction

- To learn by doing—reinforce lectures
- To gain experience in preparation for lectures
- To learn physical concepts
- To learn measurement techniques
- To learn how to use equipment
- To learn data analysis
- To provide a “hands-on” experience
Laboratory Objectives and Goals: Students' Expectations

- Education is a business and we are expected to deliver a quality product
- Student performance will rise to the instructors' expectation: little is received from those from whom little is expected
- Reports should be graded so that they can be returned by the next lab period (especially the first two)
Laboratory Objectives and Goals: Perceptions and Reality

- Present a positive attitude
- Body language is responsible for 75% of what is communicated
- “Never let them see you sweat”
  - Show confidence backed up by good preparation
Laboratory Objectives and Goals: Perceptions and Reality

- Think about the implications of what you say and do
  - If you cancel a lab, cancel an experiment, or shorten an experiment, what are you saying to the student by your action?
  - What values are implied by your actions?
Laboratory Objectives and Goals: Perceptions and Reality

- The purpose of the laboratory
  - to train doctors and health professionals who will treat YOU in the future
  - To train engineers who are going to design bridges that YOU drive over and buildings that YOU occupy
Laboratory Objectives and Goals: Perceptions and Reality

- Education is a business
  - Compare University students with technical school students
- These are proven experiments and THEY WORK!
Blackboard

- Dr. Breinig will conduct a session on Blackboard, on Friday afternoon, August 9, 2013 at 1:30.
The Laboratory Report

- Use guidelines in lab manual: grade carefully
- Return graded labs at next lab period
- Grading of first two lab reports is important
- Coordinate grading scale with lecture professor
The Laboratory Report (cont’d)

- Coordinating grading for large classes
  - See the professor in charge and receive instructions
  - Maintain a uniform and consistent grading procedure
  - Strive for a 85% average
Attendance and Laboratory Make-Ups

- Maintain attendance records: long-term absences will be handled differently
- Lab is a “hands-on” experience
  - Don’t cancel lab or experiments
  - Avoid a stated policy where students can miss one lab
Attendance and Laboratory Make-Ups

- A make-up session will be held the last week of labs and will be a different experiment
- Labs can be made up the same week in another section if arrangements are made by the student’s TA with another TA
Laboratory Apparatus

- Normal use and care
  - Apparatus should be treated with care
  - Lab is a “hands-on” experience and wear and tear comes with the territory
Laboratory Apparatus (cont’d)

- Maintenance and repair
  - If you break it, fix it or see to it being fixed
  - Electronic apparatus should be taken to the electronics shop for repairs - OR- placed on file cabinet with a note of needed repair
  - Refer computer hardware problems to the electronics shop
Laboratory Apparatus (cont’d)

- Maintenance and repair
  - Refer computer software problems to Dr. Parks
  - Other apparatus breakage and needed repairs should be referred to Dr. Parks
Laboratory Apparatus (cont’d)

- Procedures for reporting needs
  - Needs for additional supplies and equipment should be reported to Dr. Parks
  - Needs for computer supplies including paper and printer ribbons should be reported
  - Best way to communicate needs is a note in mailbox
Laboratory Apparatus (cont’d)

Computers and data acquisition issues

– Opportunities for improving communication and instruction
– Adhere to all copyright laws
– Use care in connecting external sources to PASCO box
– Report any malfunctions or software problems to Dr. Parks
Miscellaneous Items

- Astronomy labs
  - Follow syllabus and physics TA instructions (e.g. office hours, make-up labs, etc.)
  - Care of apparatus–see Paul Lewis
  - Observation Experiments
- Mentoring Program
- Other issues
TA Feedback

- Your input is appreciated and considered
- You are on the front line and are best informed
- Share your information
- NOW IS AS GOOD A TIME AS ANY!
TA Feedback (cont’d)

- My Contact Information:
  - Office: Room 404 Physics
  - Office Phone: 974-8952
  - Home Phone: 483-5255
  - Cell Phone: 924-5797
  - E-mail: jeparks@utk.edu
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by

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Fall 2013
Recitation Section Guidelines for Teaching Assistants

• General
  – Purpose
  – Series of attitudes

• Professional Attitude
  – Teaching is a business
  – The student is our customer

• Teaching Attitude
  – Teach problem solving skills as opposed to working the problem
Recitation Section Guidelines for Teaching Assistants (cont’d)

• Salesman’s Attitude
  – Have a good product and believe in it
  – Be enthusiastic about the recitation sections
  – Make the recitation sections attractive to the student
    » Encourage the students to seek your help
Recitation Section Guidelines for Teaching Assistants (cont’d)

• Team Attitude
  – Communicate with the lecture professor
  – Coordinate your activities with the lecture
  – TA should know the topics being studied
Recitation Guidelines for Problem Solving

- Read the problem
- Extract the given information
- Make a realistic diagram
- Determine the correct dimensions and units
- Determine the applicable physics principle(s)
- Write the applicable equations
Recitation Section Guidelines for Problem Solving (cont’d)

- State the unknown parameters to be solved
- Organize the problem neatly and logically
- Process/calculate the information
- Perform a reality check
- Perform a dimensional analysis
- Teach the methods and organization
The End
UT Physics Teaching Assistants
Training and Review Sessions

Laboratory Safety and Security

by

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Fall 2013
Laboratory Safety and Security

- General hazards
  - Mechanical hazards
    - Furniture
    - Weights
    - Glass cuts
  - Electrical hazards
    - AC frayed cords
    - High voltage sources
Laboratory Safety and Security (cont’d)

• AC outlet box on lab bench is hot, be careful
• Laser and light hazards
• Laser light
• UV light sources
Laboratory Safety and Security (cont’d)

- Chemical hazards
  - Acid in eluate for minigenerator; mercury thermometers

- Fire and burn hazards
  - Light sources are hot; water baths are scalding
HAZARDOUS MATERIALS CLASSIFICATION

HEALTH HAZARD
4-Deadly
3-Extreme danger
2-Hazardous
1-Slightly hazardous
0-Normal material

FIRE HAZARD
Flash Points
4-Below 73 F
3-Below 100 F
2-Below 200 F
1-Above 200 F
0-Will not burn

REACTIVITY
4-May detonate
3-Shock and heat may detonate
2-Violent chemical change
1-Unstable if heated
0-Stable

SPECIFIC HAZARD
Oxidizer OXY
Acid ACID
Alkali ALK
Corrosive COR
Use NO WATER W
Radiation Hazard 
Fire Triangle--3 Things Needed to Start a Fire

- Fuel
- Oxidizer
- Heat or Ignition Source
Fire Extinguisher Safety

- Fire Extinguisher Types
  - A  Water
  - ABC  Dry Chemical
  - BC  CO2
  - D  Metal Specific
Fire Extinguisher Safety

Common Classifications

- **Class A: Ordinary Combustibles**
  - e.g. Wood, cloth, paper, rubber, and many plastics.

- **Class B: Flammable Liquids**
  - e.g. Oil, oil based paint, gases, greases, paint thinner, dry cleaning agents, tar, propane, and natural gas.
Fire Extinguisher Safety
Common Classifications (cont’d)

- **Class C**: Live Electrical Equipment
  - e.g. wiring, fuse boxes, circuit breakers, machinery, and appliances.

- **Class D**: Combustible Metals
  - e.g. Sodium, magnesium, titanium, zirconium, lithium, and potassium.
Fire Extinguisher Safety
PASS: Use of a Fire Extinguisher

- **P= Pull the Pin:** This will unlock the operating lever and allows you to discharge the extinguisher.
- **A= Aim Low:** Point the extinguisher hose or nozzle at the base of the fire.
- **S= Squeeze Handle:** This discharges the extinguishing agent.
- **S= Sweep from side to side:** Moving carefully toward the fire, aim the extinguisher at the base of the fire and sweep back and forth until the fire is out.
Fire Extinguisher Safety

Fire Safety Tips

- Do not attempt to fight a large or rapidly spreading fire.
- Keep your back to the exit.
- Stand 6 to 10 feet from the fire.
- Use the correct extinguisher for the type of fire.
- Do Not use water or Class A extinguisher on a grease or electrical fire.
- Extinguishing agent will only last 10 to 30 seconds.
Laboratory Safety and Security (cont’d)

- Radiation hazards
  - Minimize exposure even though sources are small
  - Pregnancy declaration policy
Laboratory Safety and Security (cont’d)

Pregnancy Policy
Radiation Safety (cont’d)

For Cesium 137 Sources:

• At 25 cm, the exposure is .024 mrem/hour.

• It would take 20,000 hours of exposure to receive a dose of 500 mrem.
Radiation Safety: Limiting Exposure

- **Time:** Limit Time of Exposure
- **Distance:** Maximize Distance to Source
- **Shielding:** Maximize Amount of Shielding
Laboratory Safety and Security (cont’d)

- Basic safety issues
  - Location of first aid kid
  - Emergency reporting procedures: Dial 911
  - Balance hazard with over-concern
Laboratory Safety and Security (cont’d)

• Compressed Gas Safety
  – Mark and return empty cylinders
  – Keep caps and only move cylinders with caps
  – Use a cylinder cart to transport them
  – Gas Cylinders must be secured when in use
Laboratory Safety and Security (cont’d)

- Locking and unlocking labs
- Admission of students to closed labs
- Opening/closing windows
  - Effect of adverse weather on equipment
  - Unbalancing of temperature control
- Last man rule or transfer of responsibility
- Don’t borrow equipment!!!!!
- Report any strange occurrences, situations, or breaches of security
Special Considerations for the Physically Impaired

- Report classes that have students with special needs
- Special problems can be addressed and we want to do so
- Be sensitive—be aware—think
- Anticipate and report forthcoming problems and needs
Proctoring and Grading Procedures

- Report to your assigned professor at the beginning of the semester to receive instructions
- Adhere to appointments
- Unreasonable requests should be brought to my attention
- Lack of work should be brought to my attention
MSDS: Material Safety Data Sheet

I. Identification

- Chemical name: Acetone
- Molecular weight: 58.08
- Chemical family: Ketone
- Synonym: Dimethyl Ketone
- DOT # 2100
- CAS: 67-64-1

II. Physical and Chemical Data

- Boiling point: 56.2°C
- Freezing point: -94.7°C
- Vapor density (air = 1): 2.0
- Solubility in water: >20°C complete
- Specific gravity (f/D = 1): 0.72
- Appearance and odor: Clear, colorless liquid with a penetrating, sweet odor.
- Moisture or other material to avoid: Strong oxidizing agents and strong acids and bases.
- Hazardous decomposition products: Incomplete combustion can generate carbon monoxide and other toxic vapors.

III. Fire and Explosion Hazard Data

- Flash point (closed cup): -18°C
- Autoignition temperature: 465°C
- Explosion limits: 2.6 - 12.8
- Flammable gas mixtures:
  - Carbon dioxide, dry chemical, alcohol foam, water mist or fog.
- Special fire fighting procedures: Wear full protective clothing and self-contained breathing apparatus. Keep fire-exposed containers cool with water spray.

IV. Hazardous Components

- Acetone

Burdick & Jackson's Disclaimer: The information and recommendations presented in this Material Safety Data Sheet are based on sources believed to be accurate. The user is responsible for determining the product's suitability for its intended use, the product's safe use, and the product's proper disposal. No representations or warranties, express or implied, of merchantability or fitness for a particular purpose or otherwise, are made with respect to the information provided in the Material Safety Data Sheet. The user of this Material Safety Data Sheet assumes the risks of using the information contained herein.
MSDS: Material Safety Data Sheet

- Identification
  - Chemical and common names
  - Hazard class
- Physical and Chemical Data
  - Appearance and odor
  - Conditions to avoid
- Fire and Explosion Hazard Data
  - Unusual fire and explosion hazards
- Hazardous Components
MSDS: Material Safety Data Sheet (cont’d)

- Fire and Explosion Hazard Data
  - Unusual fire and explosion hazards
  - Extinguishing media
  - Special fire fighting procedures
- Hazardous Components
- Health Hazards
  - Occupational Exposure Limits
  - Carcinogenic Data
  - Primary Routes of Entry
  - Effects of overexposure
  - Emergency first aid
MSDS: Material Safety Data Sheet (cont’d)

- Health Hazards
  - Occupational Exposure Limits
  - Carcinogenic Data
  - Primary Routes of Entry
  - Effects of overexposure
  - Emergency first aid
- Safety Measures and Equipment
- Spill and Disposal Data
- SARA/Title III Data
Right to Know Station

- Located in Room 404 Nielsen Physics Building
- File of MSDS
- File of Safety Books
- Chemical Hygiene Plan
Preparation for Emergency Situations

- Learn the location of emergency exits and the shortest routes to these locations.
- Learn the location of emergency alarm activation stations.
- Learn the procedures for reporting emergencies -- Dial 911.
Preparation for Emergency Situations (cont’d)

- Learn the sound of emergency alarm systems
- Learn the location of fire extinguishers.
Chemical Hygiene Plan

- Located at the “Right to Know” station in Room 404, Nielsen Physics Building
Chemical Hygiene Officer

- Dr. James Parks
- Office Location:
  Room 404
  Nielsen Physics Building
- Lab Location:
  Room 303
  Nielsen Physics Building
Departmental Radiation Safety Officer

- Dr. James E. Parks
  - Office Location:
    Room 404
    Nielsen Physics Building
Learning Objectives

Individuals who produce or handle hazardous waste will be able to:
1. Identify hazardous waste
2. Ensure it is properly managed
The US Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation require documented training for individuals who handle or produce hazardous waste.

This program has been designed to meet these requirements.
Hazardous Waste Can Exist as Any of the Following

- Solid
- Liquid
- Gas
- Sludge

Hazardous waste is a material that no longer has an intended value.
Categories of Hazardous Waste

- Corrosive (pH less than 2.0 or greater than 12.5)
- Ignitable – also known as flammable
- Reactive
- Toxic – very broad category
Categories of Hazardous Waste

- EPA also publishes lists of hazardous waste
- If you are unsure if a substance is a hazardous waste, contact Environmental Health and Safety (EHS) at 974-5084
Hazardous Waste Exclusions

The following categories of waste are not considered hazardous waste for this program:

1. Sewage
2. Regular trash
3. Universal waste (fluorescent bulbs, batteries, recalled pesticides)
4. Radioactive and biohazard–regulated elsewhere with detailed rules for handling and shipping
Improper Disposal Methods

Hazardous waste must not be discarded by:

- Sanitary Sewer
- Storm Sewer
- Regular Trash
- Mixed with Biohazard
- Evaporation (a container without a lid implies evaporation for volatile substances)
- Mixing With Non-hazardous Waste
Empty Containers

Empty containers (bottles, cans, jars, bags, etc) that once held a hazardous substance may be discarded in the regular trash and are not considered hazardous waste.

Exception – Containers that held acutely hazardous materials are regulated as hazardous waste.
Empty Containers

The list of acutely hazardous substances that require the container be triple rinsed can be found at:

http://web.utk.edu/~ehss/chemical/chem4.htm

* These are known as P-listed wastes and start about ¼ of the way down the web page.
* Note that the rinsate is consider hazardous waste and must be managed accordingly
* When in doubt, contact Environmental Health and Safety
Definition

An empty container is defined as one where:

- All waste has been emptied using common practice
- Maximum 1 inch of product remains in container
- No more than 3% by weight of the container remains (tanks <110 gallons)

Effective February 1, 2008 UT will start collecting aerosol cans and managing as a hazardous waste, even though they are considered empty.
Elementary Neutralization

- Elementary neutralization (example – acid/base) is acceptable.

- The neutralized waste can then be rinsed down the drain, if the only hazard is corrosivity and there are no other hazards (such as heavy metals, toxins, reactivity, etc.).
How do you know if a material is considered a hazardous waste?

- The burden of proof is on the generator
- May need to analyze the substance
- Check the material safety data sheet (MSDS)
- Unlabeled containers present a number of problems
- When in doubt – call EHS at 974-5084
Proper Labeling

- All waste containers must be properly labeled.
- Do not use general terms or nomenclature such as:
  - Waste
  - Solvent
  - Formula
  - Trade names
- Containers must be labeled to include all hazardous components and concentration
Hazardous Waste Labels

- Available from EHS
- New labels are yellow with red letters
- Do not complete the “date” section of the label – this will be done when the waste is removed from the lab
Containers

Contents must be compatible with container material

Problems:
- Certain solvents placed in plastic containers
- Hydrofluoric acid in glass containers
Containers

- For container selection - look at original container material
- The container must be closed
- Must be in good condition (no cracks or rust)
- Clean on outside
Containers

Do not mix incompatibles that will produce:

- Heat
- Violent reactions
- Fire/Explosion
- Flammable or toxic gases
Containers

- Maximum amount that can accumulate in the lab is 55 gallons or 1 kilogram of acutely toxic waste.
Containers

- Bags are ok for dry solids
- Sharps (glass, pipettes, needles) must go in puncture-resistant containers
Containers

Containers that held acutely hazardous waste must be triple rinsed or be managed as a hazardous waste.

Rinsate is then considered acutely hazardous and must be managed appropriately.
Containers

- Protect from
  - Ignition sources
  - Vandalism
  - Breakage
  - Spillage
- Cabinet storage is an option
Containers

Biohazard - don’t place chemical waste in a red biohazard bag or sharps container.
Satellite Accumulation Area

Definition – area in the lab where waste chemicals are stored.
Satellite Accumulation Area

- Must be designated with signs – available from EHS
- May need to segregate chemicals and provide secondary containment (example pans)
Regulations

- Tennessee
  - Tennessee Department of Environment and Conservation (TDEC)
  - TCA Chapter 1200
Top Ten Violations

The list on the following two pages was developed by the Tennessee Department of Environment and Conservation (TDEC)

Items in red font are under the control of lab workers and frequently cited on campus
Top Ten Hazardous Waste Violations

1. Open Containers – lid not in place
2. Hazardous Waste Labels – missing, or incomplete
3. No Date on Container Label at Storage Site
4. Inadequate Aisle Space at Central Storage Facility
5. Hazardous Waste Determination – waste has not been characterized
Top Ten Hazardous Waste Violations

6. Satellite Accumulation Area – no sign
7. No Weekly/Daily Inspection Log
8. No Emergency Equipment and/or Phone at Accumulation Site
9. Personnel Training – no documentation
10. No Waste Reduction Plan
Top Ten Hazardous Waste Violations

Violation of hazardous waste regulations can result in substantial fines to the university.
State regulations require the university have a hazardous waste reduction plan. The following slides were developed to assist lab workers reduce the amount of hazardous waste generated by the university.
Hazardous Waste Reduction Ideas

- Substitution with a non-hazardous substance
- Microchemistry or reduced volumes
- Avoid mixing or contamination with non-hazardous substances
- Order in small quantities
Hazardous Waste Reduction

Chemical exchange definition -
- Orphaned chemicals
- No longer needed by the user
- Still usable or has value
- Often in their original containers and unused
Hazardous Waste Reduction

Candidates for chemical exchange:

- The chemical has not expired and has factory seal in place
- Has no visible signs of degradation
- Does not degrade with time
- Has been stored within parameters (time, temperature, humidity, light, etc)
Waste Exchange

UT Chemical Exchange is found at:

Hazardous Waste Reduction - Ideas

- Distillation of solvents
- Elementary neutralization – acid/base
- Administrative Controls
  - inventory management
  - spill prevention
- Phase separation (example - one liquid floats and won’t readily mix with another in the same vessel)
Hazardous Waste Reduction

- Contact EHS (x5084) to discuss hazardous waste reduction – even activities that have occurred in the past
- We need to demonstrate and document hazardous waste reduction for compliance purposes
Documentation of Training

To document that you have received training, please complete the quiz and send to:

Environmental Health and Safety
916 22nd Street

You will be notified of the results via mail.
Hazardous waste containers must be kept closed, properly labeled, in good condition, acceptable for the contents and properly stored.

Labels and regulatory guidance are available from EHS (x5084)

Strive for hazardous waste reduction
UT Physics Teaching Assistants
Training and Review Session

by
Dr. James E. Parks
Director of Undergraduate Laboratories

Department of Physics
Nielsen Physics Building
The University of Tennessee, Knoxville
Knoxville, Tennessee 37996-1200

Fall 2013
Sexual Harassment is Illegal

• The University of Tennessee, Knoxville is committed to providing an environment free of sexual harassment. Sexual harassment by any member (faculty, staff, students, applicants) of the University community is a violation of Federal and State laws and University policy. Sexual harassment will not be tolerated. Sexual harassment is an issue which may affect any member of the University community and will be dealt with promptly by the University administration.
Myths about Sexual Harassment

• If females would just say “No” it would stop.
• Harassment will stop if a person just ignores it.
• If females watched the way they dress, there would not be a problem with sexual harassment.
• Sexual harassment is no big deal - it’s the natural way males and females express affection and friendship with each other.
• Most people enjoy sexual attention at work and school. Teasing and flirting make work and school fun.
Myths about Sexual Harassment (cont’d)

• Sexual harassment is harmless. Persons who object have no sense of humor or don’t know how to accept a compliment.

• Sexual harassment policies will negatively affect friendly relationships between students and teachers, or those between male and female students.

• Nice people could not possible be harassers.
Profile of Sexual Harassment: Survey of Faculty, Staff, and Students

- 27% of Women and 10% of Men say they have been Harassed
- Most are Undergraduates
- Most Experience what they say is Verbal Harassment
- Most Perpetrators are Peers

Source: 1994 UTK Social Science Research Institute
The Two Types of Sexual Harassment

1. Quid Pro Quo ("this for that")
   unwelcome sexual advances, requests for sexual favors, and other verbal and physical conduct of a sexual nature when:
   - Submission to such conduct is made either explicitly or implicitly a term or condition of an individual’s employment or academic status is a course, program, or activity; or
   - Submission to or rejection of such conduct is used as the basis for employment or academic (grades, academic progress, internships, etc.) decisions affecting an individual.
2. Hostile Environment

unwelcome sexual advances, requests for sexual favors, and other verbal and physical conduct of a sexual nature when:

– Such conduct has the purpose or effect of substantially interfering with an individual’s work performance, academic performance, or creating an intimidating, hostile, or offensive work or academic environment.
Physical Harassment May Include:

- Patting, Pinching, and any other Inappropriate Touching or Feeling
- Brushing Against the Body
- Attempted or Actual Kissing or Fondling
- Assault
- Leering or Ogling, i.e. Staring at Another’s Gential Area
- Making Obscene Gestures
Verbal Harassment May Include:

• Sexual Innuendos, Comments, and Sexual Remarks about One’s Clothing, Body, or Sexual Activities
• Suggestive or Insulting Sounds
• Whistling in a Suggestive Manner
• Humor and Jokes about Sex or (Wo)Men in General
• Sexual Propositions, Invitations, or other Pressures for Sex
• Implied or Overt Threats
Possible Disciplinary Actions

- Oral and/or Written Reprimand
- Change in Status (e.g. Reassignment, Demotion)
- Suspension
- Counseling
- Monetary Loss (e.g. Denial of Raise)
- Any Combination of the Above
- Termination
Be Cautious of These Phrases

• It’s just teasing - no big deal.
• I know he/she didn’t mean anything like that.
• If they wouldn’t dress like that there wouldn’t be any sexual harassment.
• If you’re going to work (or study) here, you need to learn to handle things like that.
• Just ignore it.
• He puts his arm around everyone.
• Why can’t she learn to accept a compliment?
Be Cautious of These Phrases (cont’d)

- She must have wanted it; otherwise she would have told him “No.”
- It’s just a joke; what’s the big fuss about?
- Boys will be boys.