Introduction to Teaching in the General Chemistry Labs

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2015
Activity

• I am excited about…

• I am afraid of….
Orientation Goals

• Introduce TA’s to the GenChem Labs
  o Size of the Lab Program
  o Policies/Procedures
  o Expectations/Responsibilities
  o Lab philosophy
  o Lab space & equipment

• Build Teaching Skills
  o Speaking in public
  o Teach, don’t tell
  o Build positive rapport correctly

• Professionalism during the semester

• Prepare for Lab
  o Prepare for 1st Day of Lab
  o Prepare first pre-lab talk (Exp 1 or 10) w/in Coordinator’s vision
  o Demonstrate competence with lab material

• Practice labs and practice teaching
The Classes

• CHE 111 – General Chemistry I Lab
  o Accompanies CHE 105 (the lecture), CHE 105 is a pre-requisite/coreq.
  o Deals with the properties of chemical substances and provides an introduction to quantitative chemical analysis
  o Introduces students to basic laboratory techniques
  o Teaches students to write lab reports

• CHE 113 – General Chemistry II Lab
  o Accompanies CHE 107 (the lecture), CHE 107 is a pre-requisite/coreq. CHE 105 is a pre-requisite
  o Emphasizes qualitative and quantitative chemical analysis
  o More in depth analysis
  o Students expected to apply knowledge gained in 111
Who are Our Students?

- **Fall 2012**
  - CHE 111
    - 1391 students enrolled (1392 seats available)
    - 76% freshmen, 16% sophomore
  - CHE 113
    - 353 students enrolled (408 seats available)
    - 20% freshmen, 53% sophomores

- **Fall 2013**
  - CHE 111
    - 1406 students enrolled
  - CHE 113
    - 351 students enrolled

- **Fall 2014**
  - CHE 111
    - 1438 students enrolled
  - CHE 113
    - 356 students enrolled
  - Total of 1794 students!!
Who are Our Students?

- Students Majoring In:
  - Agricultural Biotechnology
  - Agriculture
  - Animal Sciences
  - Biology
  - Chemistry
  - Food Science
  - Human Health Sciences
  - Human Nutrition
  - Nutrition & Food Science – Hospitality Mgt & Tourism

- Pre-Biosystems Engineering
- Pre-Chemical Engineering
- Pre-Materials Engineering
- Pre-Mechanical Engineering
- Pre-Medical Laboratory Sciences
- Pre-Mining Engineering
- Secondary Education – Science Education
Who are Our Students?

• Other Majors of Note
  o Chinese Language & Literature
  o Equine Science & Management
  o Pre-nursing
  o Sociology
  o Undeclared

  o Undergraduate Studies
  o Kinesiology
Who are Our Students?

- **UK Core Required Course**
  - **General Education Program**
    - Goal is to broaden students' understanding of themselves, the world we live in, their role in our global society, and the ideals and aspirations that have motivated human thought and action throughout the ages.
  - **Learning Outcomes**
    - Demonstrate understanding of & ability to employ the process of intellectual inquiry
    - Demonstrate competent written, oral, and visual communication skills both as producers and consumers of information.
    - Demonstrate an understanding of and ability to employ methods of quantitative reasoning.
    - Demonstrate an understanding of the complexities of citizenship and the process for making informed choices as engaged citizens in a diverse, multilingual world.
  - Must take CHE 105 & 111 to earn UK Core credit.
The Setup

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Note: The tables represent the schedule for each station, with time slots and available shifts marked.
Lab Space
How do I fit in?

Department Chair
Dr. Steve Yates (Interm)

Director of General Chemistry
Dr. Jack Selegue

General Chemistry Lab Supervisor
Dr. April French

Your Research Advisor

CHE 113 TA's (~10 people)
you

Students in Section ~24 students

CHE 111 TA's (~20 people)

Students in Section ~24 students

Students in Section ~24 students

Students in Section ~24 students

Students in Section ~24 students
Your Lab Responsibilities

• Helping Students Learn Chemistry
• Safety, Safety, Safety!!
• Lab Sections
  o CHE 111 - 3 sections, required for graduate students
  o CHE 113 - 2 sections, required for graduate students
  o Each section has 48 students, split up between 2 TA’s
• Conducting Pre-Lab Talks
  o Typically 10 minutes at the beginning of lab
  o Relates lab activities to lecture material
  o Review course announcements
• Knowing, Following & Enforcing Course Policies
• Safety, Safety, Safety!!
Your Other Responsibilities

• Helping Students Learn Chemistry
• Safety, Safety, Safety!!
• General Chemistry Learning Center (CP-133)
  o Home for office hours of ALL General Chemistry TA’s (i.e. CHE 105 recitation, 111, & 113)
  o Answer questions from students in CHE 103, 105, 107, 109, 197, 111, and 113.

• Student Support
  o Office hours
  o Answering email
  o Answering questions
  o Grading
  o Proctoring Exams

• Completing other tasks as requested
About Me

• PhD in Chemistry
  University of Kansas
  o Chemical Education
  o Organic Chemistry

• Northwestern State
  University Assistant Prof.

• University of Kentucky
  Lab Supervisor since 2011

• Focused on
  o Informal learning (learning outside of the classroom)
  o Large lecture classroom experiences
  o Understanding how students learn

• Interests in
  o Teaching & Learning in laboratory environments
  o Teaching scientific writing
  o Integration of students into communities of practice
My Responsibilities

- Lab Experiments
- Laboratory Maintenance
- Supervision of TAs
- Student Support
My Responsibilities

• Student Support
  o Answering questions students have
  o Maintain
    • Course syllabus
    • Course Blackboard site
    • Chem21 site
    • Wordpress site
    • Set course policies
  o Write quizzes & exams
  o Calculate final grades
  o Enforce course & university policies
  o Provide support for GCLC & ChemExcel
  o Adapt curricula

• Supervision of TAs
  o Train & Schedule TA’s
  o Support TAs
  o Hold regular TA meetings
  o Perform 2 TA evaluations per semester

• Laboratory Maintenance
  o Lab equipment
  o Computer equipment
  o Consumables inventory
  o Maintain Laboratory Safety Manual & appropriate safety documentation

• Lab Experiments
  o Write new laboratory experiments
  o Edit lab manual

• Keep everything running smoothly
Changes to the Lab Manual

• Lab readings based upon idea of students working at a chemical facility.
  o Build idea that they are part of a community of practice (aka they will be getting a job some day).

• Labs set up a problem that they are trying to solve.
  o Help students identify when they need a hypothesis versus a goal
Changes to the Lab Manual

• Students have the role of employee, TA’s their supervisor

• Addition of new Experiments
  o Experiment 1 – Academic Integrity
  o Experiment 7 – Determining Unknown Concentration
  o Experiment 15 – Analysis of Water Quality

• How will this change how you present pre-labs?

• What do you need to do to engage students?

• How do you address student’s questions?
Changes for Assignments

- **CHE 111**
  - Sapling Learning
    - Students self-registrar with “@uky.edu” email
    - Quizzes
    - Pre-lab assignments
  - Chem21
    - Username/password sent out from lab supervisor
    - Quizzes
    - Pre-lab assignments
  - Blackboard
    - Lab report submission
    - Screenshot of SafeAssign report

- **CHE 113**
  - Chem21
    - Username/password sent out from lab supervisor
    - Quizzes
    - Pre-lab assignments
    - Post-lab data analysis
  - Blackboard
    - Lab report submission
    - Screenshot of SafeAssign reports
Lab Safety

• Lab PPE for Gen Chem Labs
  • https://prezi.com/osht7whmuh45/appropriate-laboratory-attire/?utm_campaign=share&utm_medium=copy

• Lab Safety
  • https://www.youtube.com/watch?v=YdYapyzJNscE&list=PLY7ouzgRhKZTXYi-s3hqQjV4U1GdQzbQG&index=8
Bloom’s Taxonomy

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

- Memorizing verbatim information. Being able to remember, but not necessarily fully understanding the material.
- Using information to solve problems; transferring abstract or theoretical ideas to practical situations. Identifying connections and relationships and how they apply.
- Combining information to form a unique product; requires creativity and originality.
- Making decisions and supporting views; requires understanding of values.
- Identifying components; determining arrangement, logic, and semantics.
- Restating in your own words; paraphrasing, summarizing, translating.

This pyramid depicts the different levels of thinking we use when learning. Notice how each level builds on the foundation that precedes it. It is required that we learn the lower levels before we can effectively use the skills above.
Introduction to the CHE 111 Lab Manual’s Philosophy
In your groups, read the course schedule and discuss amongst yourselves the course policies & class schedules for both CHE 111 & 113. Be prepared to present sections from the syllabus as you would on the first day of lab to your students.
Leading a Lab Section (Part 1)

Split into groups of 2 consisting of 1 mentor TA and 1 mentee TA. Select an experiment from CHE 111 or 113 and have the mentor TA teach it to the other TA. Discuss the chemistry involved in the lab, how to use equipment in the lab, and common student problems. Make sure you as the mentor TA know any changes made from prior semesters and incorporate them into your teaching experience.
Leading a Lab Section (Part 2)

In front of the class, each mentee TA will teach us about their experiment, based upon the knowledge acquired from their mentor TA. The class is expected to ask the presenter questions like their students in lab.