**CHEM 233 Course Objectives**

**Laboratory Safety**

* Review proper laboratory attire and demeanor
* Understand the importance and format of a properly written lab report
* Review hazards associated with flammability
* Review hazards associated with toxicity
* Review hazards associated with highly corrosive materials
* Review proper disposal of chemical waste
* Review proper disposal of sharp objects (needles, broken glass)
* Discuss common causes of laboratory accidents and how to avoid them
* Review proper behavior in case of an accident
* Review the significance of personal health issues: anosmia, chemical allergies, hemophilia, color blindness, pregnancy, etc.

**Experiment 1 – Melting Range**

1. Apply proper laboratory safety
2. Discuss proper use of Meltemp Apparatus
3. Demonstrate proper use of Meltemp melting range apparatuses
4. Use Meltemp Apparatus to find melting range of unknown sample
5. Identify unknown sample based on melting range
6. Construct proper scientific laboratory report

**Experiment 2 – Recrystallization**

1. Apply proper laboratory safety
2. Discuss proper recrystallization technique
3. Demonstrate proper recrystallization technique
4. Show amount of recrystallized product obtained
5. Identify melting range of recrystallized product
6. Construct proper scientific laboratory report

**Experiment 3 – Thin Layer Chromatography**

1. Apply proper laboratory safety
2. Discuss thin layer chromatography theory
3. Demonstrate proper thin layer chromatography technique
4. Identify unknown samples
5. Reproduce thin layer plate in laboratory notebook
6. Construct proper scientific laboratory report

**Experiment 4 – Acid/Base Extraction**

1. Apply proper laboratory safety
2. Discuss acid/base extraction theory
3. Demonstrate proper use of a separatory funnel
4. Separate complex mixture into components using extraction
5. Show amount of each material extracted
6. Identify melting range of extracted materials
7. Construct proper scientific laboratory report

**Experiment 5 – Distillation**

1. Apply proper laboratory safety
2. Discuss proper use of distillation apparatus
3. Demonstrate proper distillation technique
4. Obtain boiling point of unknown substance
5. Obtain purified unknown substance via distillation
6. Construct proper scientific laboratory report

**Experiment 6 – IR**

1. Apply proper laboratory safety
2. Discuss infrared spectroscopy background information and technique
3. Demonstrate proper use of IR machine
4. Obtain IR spectrum of unknown substance
5. Identify unknown substance using IR and boiling point information
6. Construct proper scientific laboratory report

**Experiment 7 – 1-Bromobutane Synthesis**

1. Apply proper laboratory safety
2. Discuss Sn2 chemistry and mechanism
3. Discuss reflux apparatus
4. Demonstrate proper use of reflux and distillation techniques
5. Demonstrate proper use of separatory funnel to wash product
6. Obtain mass, volume, density, IR, and percent yield of purified product
7. Construct proper scientific laboratory report

**Experiment 8 – 2-chloro-2-methylpropane Synthesis**

1. Apply proper laboratory safety
2. Discuss Sn1 chemistry and mechanism
3. Demonstrate proper use of separatory funnel
4. Demonstrate proper use of distillation technique
5. Obtain mass, volume, density, IR, and percent yield of purified product
6. Construct proper scientific laboratory report

**Experiment 9 – Cyclohexene Synthesis**

1. Apply proper laboratory safety
2. Discuss dehydration(E1) of alcohols chemistry and mechanism
3. Demonstrate proper use of fractional distillation using a Vigreux column
4. Demonstrate proper use of separatory funnel to wash product
5. Obtain mass, volume, density, IR, and percent yield of purified product
6. Construct proper scientific laboratory report

**Experiment 10 – Meso-1,2-Dibromo-1,2-Diphenylethane Synthesis**

1. Apply proper laboratory safety
2. Discuss addition of halogens to alkenes
3. Demonstrate proper synthetic technique
4. Demonstrate proper filtration technique
5. Obtain mass, IR, and percent yield of purified product
6. Construct proper scientific laboratory report

**Experiment 11 – Extraction**

1. Apply proper laboratory safety
2. Discuss extraction of materials from natural products
3. Demonstrate proper reflux and distillation techniques
4. Obtain mass, IR, and percent yield of purified product
5. Construct proper scientific laboratory report

**Experiment 12 – NMR**

1. Apply proper laboratory safety
2. Discuss NMR background information
3. Demonstrate proper use of NMR apparatus
4. Obtain NMR of sample
5. Identify major NMR peaks
6. Construct proper scientific laboratory report