

St. Bonaventure University
CHEMISTRY LAB 201
ANALYTICAL CHEMISTRY LAB
Fall 2020

Instructor: Dr. Carolyn Hutchinson
Office: 312B De La Roche Hall
Phone: (716) 375-2116
E-mail: chutchin@sbu.edu
Office Hours: MW 1:00 – 2:30 pm; T 11:30 am – 12:30 pm; 2:00 – 3:00 pm
 Also available by appointment
 Sign up using calendly.com/chemhutchinson
Class Schedule: R 1:00 pm – 5:00 pm
Classroom: 304 & 306 De La Roche Hall

Tentative Laboratory Schedule*

| Week | Date | Exp. | Subject | Report Due |
|------|---------------|------|--|------------------------|
| 1 | Aug 27 | 1 | Introduction to the Analytical Process: Quantitative Separation and Density of Soda | Sept 17 (2 reports) |
| 2 | Sept 3 | | | |
| 3 | Sept 10 | | Prepare Sampling Equipment for Experiments 4 and 7 <i>Collect samples outside of lab:</i> 1. Water Sample by 10/15 2. Precipitation Sample by 11/12 | |
| 4 | Sept 17 | 2 | Gravimetric Determination of Calcium | Oct 1 |
| 5 | Sept 24 | | | |
| 6 | Oct 1 | 3 | Preparing Buffers and Determining Buffer Capacity | Oct 15 |
| 7 | Oct 8 | | | |
| 8 | Oct 15 | 4 | Analysis of Water Sample Part 1: EDTA Titration of Ca ²⁺ and Mg ²⁺ | Oct 29 |
| 9 | Oct 22 | | | |
| 10 | Oct 29 | 5 | Analysis of Water Sample Part 2: Potentiometric Titration of Cl ⁻ and I ⁻ | Nov 12 |
| 11 | Nov 5 | | | |
| 12 | Nov 12 | 6 | Determining NO ₃ ⁻ and SO ₄ ²⁻ in precipitation samples using ion chromatography | Dec 1 |
| 13 | Nov 19 | | | |
| 14 | Nov 26 | -- | NO CLASS – Thanksgiving Holiday (Nov 25-29) | N/A |
| 15 | Dec 1 | 7 | Spectrophotometric Analysis of Two Compounds in a Mixture (REMOTE LAB) | Dec 10 |
| 16 | Dec 11 | -- | Last day to submit work by 11:59pm | |

* Up-to-date schedule and due dates are available on Moodle.

Interactive Syllabus

An interactive version of this syllabus can be accessed at <https://www.cphutchinson.com/chem201-f2020>. This is another way to access the information contained in the course syllabus. It does not replace the official course syllabus.

Course Description

Four hours of laboratory a week. The analytical determinations will encompass the main techniques considered in Chemistry 201.

Course pre-requisite

Take CHML-102

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Textbook/Materials

- The ACS Style Guide (Free PDF <https://pubs.acs.org/isbn/9780841239999>)
- Scientific Calculator (not graphing). Suggestions are available on Moodle.
- Course Moodle Website Access – <https://moodle.sbu.edu/>
- Lab notebook – bound composition notebook, no perforated pages

The course text will consist of a packet of handouts which will be provided via Moodle.

Course Objectives

The **main goal of CHML-201** is to develop good laboratory technique to gain accurate and precise results quickly.

Upon successful completion of CHML-201, a student will be able to:

1. Clearly convey scientific information in writing and be able to present data analysis in a clear and concise way.
2. Identify and describe the nature of the analyte of interest.
3. Utilize the analytical process and develop good laboratory techniques necessary for quantitative analysis.
4. Generate accurate and precise data using gravimetric, volumetric, potentiometric, spectrophotometric, and chromatographic methods.
5. Quantitatively describe data sets by conducting appropriate calculations for accuracy and precision.

Departmental Learning Outcomes

The Chemistry Departmental Learning Outcomes can be found here:

<http://www.sbu.edu/academics/schools/arts-and-sciences/departments-majors-minors/chemistry/learning-outcomes>

Contacting Your Instructor

The best way to reach your instructor outside of office hours is via the email on the top of this syllabus. You can expect a response within 24 hours. Outside of emergencies, emails will only be answered between 7am and 9pm M-F. Messages sent through Moodle may take up to 1 week to receive a response. Students are strongly encouraged to attend office hours and tutoring sessions if they have any questions.

Calculators & Other Technology

Calculators must be scientific. Programmable and graphing calculators are not allowed. Please see the Moodle page or interactive syllabus for suggestions. Phones **cannot** be used as calculators. You are encouraged to use the same calculator for all parts of chemistry (during class, homework, exams, lab, etc.). Students will receive one warning for cell phone use; a second warning will result in a 10% point reduction to that experiment's lab report.

Grade Distribution

Grades on all assignments will be given in points. Points in all categories will be approximately equivalent.

For lab reports, **all students must do their own calculations**, though students may and should compare their final numbers to catch mistakes prior to turning in the laboratory report.

Each category will be weighted as stated below:

| | |
|---------------------|--------------------|
| Lab Notebook: | 200 points (20%) |
| Laboratory Reports: | 800 points (80%) |
| Total: | 1000 points |

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Letter grade assignment:

| Grade | Points | Percentage |
|--------------|---------------|-------------------|
| A | 930-1000 | 93-100% |
| A- | 900-929 | 90-92% |
| B+ | 870-899 | 87-89% |
| B | 830-869 | 83-86% |
| B- | 800-829 | 80-82% |
| C+ | 770-799 | 77-79% |
| C | 730-769 | 73-76% |
| C- | 700-729 | 70-72% |
| D+ | 670-699 | 67-69% |
| D | 630-669 | 63-66% |
| D- | 600-629 | 60-62% |
| F | 0-599 | 0-59% |

If you feel that an error was made in the grading of homework or exams, you may request a re-grade by notifying the instructor within one week of receiving it.

Laboratory Notebook

Lab notebooks must have bound pages. A basic composition notebook is a good, inexpensive choice. You are expected to keep a thorough laboratory notebook of each experiment. These notebooks will be checked at the end of the laboratory period when an experiment is completed. You will receive a grade based on clarity and completeness.

The objective of the laboratory notebook is to assist the student in developing the written communication skills needed to develop scientific recognition and recording in a laboratory environment. Additional guidelines will be provided to assist the student in developing these writing skills

You are responsible for keeping a detailed and complete laboratory notebook of the work you do in lab. You are also responsible for bringing your laboratory notebook to each lab period. Lab notebooks will be signed at the beginning of each laboratory during the semester to encourage you to keep your records up to date.

Your lab notebook must contain:

- Your Name
- Experiment Title (including experiment number)
- Date on every entry
- Lab Partners
- Objective/purpose
- Chemicals and equipment (note health or safety hazards).
- Method/experimental procedure
 - listed step by step (bullet or numbered steps) instructions on how experiment is to be performed
 - during the experiment note any changes made in the procedure (e.g. actual sample mass) in your notebook
- Raw data (all data collected in lab with units) (e.g., weights, temperatures, volumes, all with units!)
- Calculations (for example - the calculation of the molarity of a solution you made)
- Results
- Conclusions

Laboratory Reports

Lab write-ups are due one week after the experiment is completed at the beginning of the laboratory period. Your lab report grade will be comprised of:

1. Written Summary of Experiment
 2. Presentation of Data
 3. Accuracy and Precision, if applicable
 4. Data Analysis and Calculations
 5. Answers to Discussion Questions
 - a. Answers must be written in complete sentences
 - b. You are encouraged / required to use additional resources such as textbooks, journal articles, reputable websites, etc. to thoroughly answer discussion questions. You must provide references for any sources you use, following the American Chemical Society guidelines: <https://pubs.acs.org/userimages/ContentEditor/1246030496632/chapter14.pdf>.
- Late lab reports will be given a 0. No exceptions.

Lab reports not completed according to the academic honesty policy will be given a 0. No exceptions.

Lab Safety Rules

Safety in the laboratory is extremely important and will be taken very seriously.

I reserve the right to eject anyone from the laboratory for violating safety rules without opportunity to make up work. The handout entitled "Safety and Laboratory Rules" must be read, understood, signed, and returned to the lab instructor before any work may begin. The safety rules and policies are for your (and everyone else's) safety. Any chemistry lab can be potentially dangerous.

FAILURE TO FOLLOW THE SAFETY RULES WILL RESULT IN EXPULSION FROM THE LABORATORY AND A GRADE OF ZERO FOR ALL COMPONENTS OF THE DAY'S WORK.

Safety will be thoroughly discussed at the first lab meeting. Additionally, a copy of the safety rules is provided in your laboratory manual. Eye protection must be worn at all times when in the chemistry laboratory. There will be no exceptions to this rule.

You must wear close-toed, close-heeled shoes in the lab. Long pants are required, and long sleeves are encouraged.

Laboratory Rules

The most important component of completing a laboratory successfully is your pre-lab preparation. You will make fewer mistakes if you have read and understood the lab write-up. In many cases you will need to figure out how to make up the necessary solutions before coming to the lab; there isn't enough time for these calculations during the lab. A half-hour of time spent before the lab may save you hours. Written objectives and procedures in your laboratory notebook will be checked at the start of each lab to help you to prepare.

Preparation

1. Read carefully and understand the lab write-up before coming to lab.
2. If you don't understand something--ask. Labs are a lot of fun, if you are prepared.
3. Look up all of the substances in the experiment in the **Merck Index** (or other suitable source) to determine if there are any health or safety hazards.
4. Plan out your solution preparation scheme before coming to lab.
5. Write everything down in your lab book.

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In the lab

1. Wear eye protection (goggles or glasses with side shields).
2. Note the location of safety equipment, fire alarms, and exits.
3. Be conscious of what others are doing around you.
4. Clean up chemical spills immediately, especially in and around balances.
5. Check with the instructor for disposal information on all chemicals and solutions. Unless stated otherwise collect all waste in labeled waste containers. Keep aqueous and non-aqueous waste separate.
6. Check with the instructor for the proper procedure for washing spectrophotometer cuvettes and cells. Never wipe cell windows with paper towels.
7. Work with concentrated acids or bases in the hoods only.
8. Make up solutions in the wet lab, not in the instrument lab.
9. Weigh out chemicals by difference or into small beakers. Don't use paper for weighing.
10. Never place a pipet directly into a solvent or solution bottle. Pour just what you need into a small beaker and pipet from the beaker.
11. Never return reagents to the bottle.
12. Record everything in your lab notebooks.

Attendance & Absences

The laboratory is an integral part of all chemistry courses, as it is here that you receive hands on training. Attendance at all lab periods is required. You are expected to be **punctual and ready to perform** the scheduled experiment. Being ready means that you have read the experiment before coming to class, you have your lab manual, laboratory notebook, ink-pens, and safety goggles, and that you are dressed properly to do the experiment. There will be **NO** laboratory make-ups.

The beginning of the laboratory session will be used to discuss various aspects of the experiment and to answer questions you may have about the experiment. Therefore, attendance at beginning the session is *required* in order to perform the laboratory to collect data, and students will not be allowed to attend lab if they arrive late.

Students who have two or more unexcused absences will receive an "F" in the course. Although no mark is assigned for attendance, it is highly likely that continual skipping of laboratories will lead to a low course grade. It is the responsibility of each student to promptly notify the instructor if there is an absence for the laboratory sessions. If a student is unable to make a lab session (due to a university designated excused absence) then the average of the existing labs will be used as a substitute for the missing laboratory grade. All unexcused absences will be given a grade of ZERO!

Late Work Policy

Late work will receive a penalty of 25% per day and will not be accepted after 4 days. This DOES include weekends for anything submitted via Moodle

Inclusion Policy

As a student at St. Bonaventure University, you have the right to an evaluation of academic performance free from discrimination on the basis of race, religion, color, gender, age, national or ethnic origin, marital status, sexual orientation, veteran status, political affiliation, or disability status. (www.sbu.edu/codeofconduct)

Students with Disabilities

St. Bonaventure is firmly committed to providing an equal opportunity for a college education to all qualified students. The philosophy of the Office of Student Disability Services reflects the interpretation of Section 504 of the Rehabilitation Act of 1973 in terms of providing reasonable and individualized accommodations. We welcome students with disabilities into our campus community and our programs.

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In this spirit, we are committed to providing reasonable opportunities to qualified students to participate in campus programs and activities. We recognize that the needs for each person with a disability are unique; therefore, services and/or accommodations are provided on an individualized basis. Students with disabilities are encouraged to participate in all aspects of campus life. Self-identification is essential and self-advocacy is encouraged.

Students with disabilities who feel they need academic accommodations should contact Adriane Spencer (aspencer@sbu.edu), Director of Disability Support Services Office, 100D Plassmann Hall (Student Success Center), 716-375-2065. Please reach out early in the semester so that we can assist you as soon as possible. Documentation from the Disability Support Services Office is required before the instructor can make accommodations.

For further information, please visit the Office for Disability Services Web site: <http://www.sbu.edu/life-at-sbu/services-for-students/disability-support-services>

Online Help & Academic Honesty

Online websites for homework should be a **last resort**. The “Experts” on these sites do not have the experience and expertise you can find at St. Bonaventure University. In my experience, the answers are nearly always incorrect. Uploading exam and homework problems is a violation of the Academic Honesty Policy. If any of my course materials are uploaded without my permission, any student **who uploads or uses** the answers from these websites will receive a **ZERO** for the assignment.

Online resources are not permitted for use for any exam. Any student suspected of cheating will receive a zero on the exam and a violation will be submitted to the Academic Honesty Committee.

Academic Honesty Policy

Enrollment at St. Bonaventure University requires adherence to the University’s standards of academic integrity. These standards may be intuitively understood and cannot, in any case, be listed exhaustively. The following examples, detailed in full in Appendix A of the Code of Conduct (<http://www.sbu.edu/codeofconduct>), represent some basic types of unacceptable behavior: cheating, plagiarism, fabrications, obtaining an unfair advantage, aiding and abetting academic dishonesty, falsification of records and official documents, and unauthorized access to records. Academic dishonesty is a serious matter and will be dealt with accordingly, with University sanctions ranging from grade alteration to the possibility of expulsion. Students should familiarize themselves with these very important provisions of the Academic Honesty Policy, which is outlined in the Code of Conduct for reference only. Acts of academic dishonesty are not processed through the University Judicial process; the process for handling alleged violations is outlined within the policy.

All academic honesty policy violations will be reported to the department chair, the student’s adviser, the Dean, and the Registrar.

Face Coverings & Other COVID-19 Considerations

According to the St. Bonaventure policy, you are required to wear a face covering that completely covers your nose and mouth at all times during class. If you come to class without a face covering, you will not be allowed to attend the class that day. If you fail to wear your face covering correctly for the entire class period, you will be required to leave immediately. If this occurs during an exam day, you will receive a **ZERO** for the exam.

The face covering cannot be made of mesh, an open knit, or another material that does not decrease the spread of droplets. Masks with vents are allowed but you are encouraged to use a second mask with them

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to minimize the spread of droplets. Any exemptions to this policy must come from the Office of Student Disability Services.

You must remain 6 feet from other people at all times during class. Group work will be facilitated using technology listed on the Course Materials page. This class will be paperless as much as possible. Office hours will be held exclusively online via Zoom. You will be asked to sanitize your desk in order to begin class.

If you travel to a [restricted state that requires quarantine](#) according to Governor Cuomo's Executive Order 205, issued June 25, 2020, contact your instructor ASAP to make arrangements. Similarly, if you are quarantined due to COVID-19, contact your instructor ASAP to make arrangements.

I sincerely thank you for all your cooperation during these unprecedented times.