Instructor: Willa M. Williams, PhD   **Class Meeting Location/Time: MASC 206**
                                     Lab: MCC 415
Office Location: MASC 202   **E-mail:willia77@mc.edu**
Office Hours: see bulletin board near chemistry office

PREREQUISITES
Prerequisites: CH 121, 122, MA111.

COURSE DESCRIPTION

This laboratory intensive course presents the fundamental methods of exact chemical analysis and includes an introduction to the use of chemical instrumentation. (Lecture meets two hours per week. Laboratory meets six hours per week.)

Textbook

> *Quantitative Analysis* by Daniel C. Harris, 7th Edition

Topics Covered

- Ch. 1: Measurements
- Ch. 3: Experimental Error
- Ch. 4: Statistics
- Ch. 5: Quality Assurance and Calibration Methods
- Ch. 6: Chemical Equilibrium
- Ch. 8: Activity and Systematic Treatment of Equilibrium
- Ch. 9: Monoprotic Acid‐Base Equilibria
- Ch. 10: Polyprotic Acid‐Base Equilibria
- Ch. 13: Advanced topics in Equilibrium
- Ch. 14: Fundamentals of Electrochemistry
- Ch. 15: Electrodes and Potentiometry

GENERAL COURSE GOALS

The following general course goals are established to meet the purposes of CH 310:

1. Provide model exercises and demonstrations that enhance the understanding of natural principles and illustrate safe laboratory techniques and practices.
2. Raise awareness of the underlying logic of the presentations and the use of inductive and deductive reasoning.
3. Develop factual report writing skills.
4. Increase scientific vocabulary and facility with common pronunciation related to the use of that vocabulary.
5. Cultivate thoughtful, probing inquiry and discussion.
6. Clarify the significance of replicated, standards or controls, measurements, data reduction and presentation

analysis, and accuracy in reporting of the scientific activities.

7. Develop sensitivity to the humane care and use of animals in classroom and laboratory settings.

<u>ST**UDENT PERFORMANCE OF OBJECTIVES**</u>

Upon completion of Quantitative Analysis students will be able to:
1. Demonstrate and model the use of standards for controls, measurements, data reduction and presentation, analysis, and accuracy in reporting of the scientific activities.
2. Model and demonstrate the scientific method as a process in hypothesis development and testing.
3. Acquire an understanding of the proper treatment of chemical equilibria (especially acid‑base equilibria) and coupled reactions
4. Understand basic electrochemistry and electroanalytical techniques.

Student's knowledge in these areas will be tested through four exams spaced throughout the semester, and a comprehensive final exam. A general lay‑out of course material to be covered is given at the end of this syllabus.

EVALUATION AND GRADING PROCEDURES
Lecture Grading

Class Tests (3)	35%	
Quizzes (weekly)	10%	
Laboratory grading		
Laboratory Reports	20%	
Pre-laboratory Exercises	10%	
Laboratory Notebook	5%	
*Final Exam	20%	
Total	**100%**	
Grading Scale	A	≥90%
	B	80.0-89.9%
	C	60.0-79.9%
	D	50.0-59.9%
	F	≤50

Final exam will consist of 50% lab material and 50% lecture material

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Americans with Disabilities Act: Mississippi College is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112‑The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled American with Disabilities Act‑(ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As faculty members, we are required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Dishonesty Policy: Mississippi College students are expected to be scrupulously honest. Dishonesty, such as cheating or plagiarism, or furnishing false information, including forgery, alteration or misuse of University documents, records or identification, will be regarded as a serious offense subject to severe penalty, including, but not limited to, loss of credit and possible dismissal. See the *Mississippi College Student Handbook* for specific information regarding penalties associated with dishonest behavior at Mississippi College. Copies of University policies are available on the Mississippi College web site.

Classroom Discipline Policies:

Proper classroom behavior is expected at all times. Improper behavior can negatively impact final grades. Elements of classroom behavior will include.

Talking and inattentive behavior:

Cell Phones: All cell phones are to be turned off and put away during class. Anyone whose cell phone goes off, or disturbs the class in any way, or if one is observed responding to a cell phone will be asked to leave. If this occurs during a quiz or exam, the student will receive a zero for that test.

Leaving the classroom during an evaluation for any reason will result in that evaluation being taken up and replaced with an alternate make up evaluation. If you need to go to the restroom do it before taking the evaluation.

Attendance Policy: Student will lose one letter grade for every **three** un-excused absences or every **four** un-excused tardies. Anyone coming in after roll call or leaving before class is dismissed is considered tardy. Any student having more than **12 total absences** excused or unexcused will receive an F grade in the course.

Excuses and Make up work. All excuses for absences must be submitted within one week of the absence**. All makeup exams will be held during finals week. No exceptions will be granted.**

Unsigned Work. Any work turned in unsigned will not be graded and no makeup will be allowed.

Tools for Success:

1. Attend class!!

2. Keep up with material. Read relevant chapters before lecture and formulate questions if a concept is unclear.

3. Dedicate appropriate study time. In Chemistry, you should consider spending three (3) hours studying outside of class for every one (1) hour of lecture.

4. Review your lecture notes after every class and seek to clarify any points which are unclear.

5. Work all of the suggested homework problems. Do not look up the answer until you have given your best effort to solve the problem on your own.

6. Don't procrastinate. These concepts take time and practice to sink in, so do not leave studying until the night before an exam.

7. Form a study group. Meet regularly to solve problems together and obtain help with difficult concepts. Collect contact info for each of your study group members.

Quantitative Analysis Laboratory Grade

Quantitative or "Quant" Lab is a course in which a high emphasis is placed on the principles of statistics, equilibrium thermodynamics, solution activity and instrumentation. As such, the laboratory is calculation intensive and requires that the student is quite careful in all lab procedures. Toward this end, the student must maintain a current status in terms of reading the lecture material and other supplements. In this regard, the lecture supplements the laboratory rather than the laboratory supplementing the lecture as is the case in many other scientific laboratories. *This course requires students to develop independence so that the burden of planning the experiments ultimately rest on their shoulders.* **Step by step guides will not be provided.** Help is, however, always available from the instructor or the lab assistants.

Grades will be assigned on the basis of the **four general categories. Pre-laboratory exercises, unknown determinations, lab reports, and final exam test questions.**

Unknowns

Most laboratory experiments will have an unknown determined that is equal to one 100 point lecture exam. In general, you will practice on known standard samples first to master the methodology. Then at an appropriate time **an unknown sample** will be provided to the student for analysis. The following **grading scale applies**:

A = 0.00 to 0.55 % deviation from actual value.

B = 0.06 to 0.95 % deviation from actual value.

C = 0.96 to 1.55 % deviation from actual value.

D = 1.56 to 1.95 % deviation from actual value.

F = $\geq$ 1.96 % deviation from actual value.

Students who score a D or F on a lab will have the opportunity to repeat the experiment during the last two weeks of lab.

Lab Notebooks

1. Each student notebook must be approved by instructor prior to the first experiment.

2. All entries must be written in ink.

3. The first few pages should be reserved for the table of contents.

4. Each page of the notebook should be properly numbered, dated and signed by student.

5. The introduction, necessary data tables, and chemical alerts should be written in the notebook prior to beginning the experiment.

6. In the event that the experiment has a graphing component, a copy of the graph should be cut and pasted into the lab notebook.

7. Each data page must be signed by instructor.

8. If an error is made while recording entries into the notebook, one line should be drawn through the mistake and the correction made beside it. There should be no other types of scribbles drawn in the notebook.

9. There should be no skipped pages in the notebook other than those reserved for the table of contents.

10. The notebook should be neat, orderly, and easy to follow.

Lab Reports

Formal Laboratory reports will be written for most experiments unless noted by the instructor. Lab reports should include any relevant graphs, copies of notebook pages, along with summaries of the numerical results and statistics in both table and paragraph format. The unknown results (raw data from replicate measurements along with means ± standard deviations when appropriate) shall be turned in on a separate sheet of paper along with the **NUMBER** of the unknown clearly indicated. **A separate handout will be given to provide further details regarding lab reports.**

Final Exam

The **final exam will be comprehensive with half of the points coming from lab and half coming from lecture.**