

**CHM 6154 (Fall, 2016)
Chemical Separations**

Instructor: Charles Cao (cao@chem.ufl.edu), 226 Leigh Hall.

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Lectures: M, W, F, 6th Period (12:50 pm to 1:40 pm), 210 CBD

Office hours: By appointments

Website: on E-learning (Canvas)

Requirement: Strong background in calculus and thermodynamics

Textbook: Unified Separation Science by J. Calvin Giddings
(John Wiley & Sons, INC)

Reference: *The Essence of Chromatography* by Colin Poole (Elsevier)

Themes:

1. Fundamentals of Separation Science
2. Gas Chromatography
3. Liquid Chromatography
4. Other Analytical Separation Techniques

Homework: Problems will be assigned throughout the semester as an aid in comprehending the course material. They will not be graded. Answers to the assigned problems will be discussed in the class.

Quiz and Exams: Four quizzes will be given throughout the semester as an aid to review the course material periodically. Two exams will be included in the course. The midterm exam covers the first and second part of the themes, and it will be a 2-hour exam during October. The final one is a comprehensive exam, but it will emphasize the last two parts of the themes.

Research Presentation & Proposal: Research-oriented study on a specific topic related to separation science. Suggested topics are listed below (note that student can also suggest a topic of his/her own interest with the approval of the instructor). This study includes (1) a thorough review of the current state of art on the research related to the chosen topic, (2) a new and novel solution from the student, and (3) student should defend that his/her solution is able to be evaluated by proposed experiments. **The results from the study will be shown as a 20-min presentation on November 19.** In addition, this presentation will be further shown in a written-form proposal. The length of the proposal is about 1800 words. **The final due date for the printout proposal: December 8, and no score will be given for a late submission.**

The topics of research projects for choice:

1. Diagnosis of Ebola infections
2. Diagnosis of Zika-virus infections
3. Quantitative detection of a cytokine in blood samples
4. An *in-vivo* device for monitoring soldiers' potential exposure to chemical and biological warfare agents in military operations.
5. Rapid detection of HIV in blood samples
6. Quantitative detection of Hg in fish
7. Detection of prostate cancer
8. Detection of single-nucleotide in a single human cell
9. Real-time measurement of the level of a specific m-RNA in single cells
10. Whole-genome sequencing of a human fetus using a blood sample of the mother
11. Isolation and transplantation of Genome of individual bacterium
12. Rapid detection of 24-hour Urine samples

Grading:

Homework:.....	0 points
4 Quizzes.....	20 points (5 points for each)
Midterm Exam:.....	80 points
Final Exam:.....	100 points
Research Presentation & Proposal:...	100 points