CHM 6154 (Spring, 2015)

Chemical Separations

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

Lectures: M, W, F, 6th Period (12:50 pm to 1:40 pm), 238 Weil Hall

Office hours: W, F, - 7th Period (1:55 pm to 2:45 pm), or by appointment

Website: http://cao.chem.ufl.edu

Requirement: Strong background in thermodynamics and calculus

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

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

Themes:
1. Introduction: Fundamentals of Distribution Equilibrium
2. Gas Chromatography
3. Liquid Chromatography
4. Other Analytical Separations

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 themes, and it will be a 2-h exam during March. The final one is a comprehensive exam, but it will emphasize the last two themes. Note that students are invited to submit suggested questions for the midterm and final exams.

Group study: Research-oriented study on a specific topic related to separation. The topic will be given by the instructor. One group is composed of two students. The group study includes (1) a thorough review of the current state of the art on the research work related to the chosen topic and (2) a novel solution from the student group. The results from the group study will be shown as a group presentation: 20-min talk. Presentation date: April 18.

The topics of group projects for choice:

1. Diagnosis of brain-eating amoeba infections
2. Quantitative detection of a cytokine in blood samples
3. An *in-vivo* device for monitoring soldiers' potential exposure to chemical and biological warfare agents in military operations.
4. Rapid detection of HIV in blood samples
5. Quantitative detection of Hg in fish
6. Detection of prostate cancer
7. Detection of single-nucleotide a single human cell
8. Real-time measurement of the level of a specific m-RNA in single cells
9. Whole-genome sequencing of a human fetus using a blood sample of the mother

Research Proposal: The topic of the proposal is on a separation technique. This topic can be related to the work from group study, but each student must submit a unique proposal. The proposal should present a novel idea that can be evaluated experimentally. The length of the proposal is about 1800 words. The final dual date: April 27, and no score will be given for a late submission.

Grading:

Homework:……..0 points
4 Quizzes……....20 points (5 points for each)
Midterm Exam:……...80 points
Final Exam:……100 points
Group study:……....40 points
Research Proposal:……..……..60 points