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CHMY 542.01: Separation Science

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CHMY 542: Separation Science

Instructor: Chris Palmer

Chemistry 203A/116B, 243-4079

christopher.palmer@umontana.edu

Off. Hours: Wednesday 9-11, and by appointment.

Reading:

No text is required for this course. I will refer to material from:

Unified Separation Science, J. Calvin Giddings, 1991

The Essence of Chromatography, Colin Poole, 2002

Additional reading materials from the current literature will be recommended.

Course Description

Chemistry 542 is a course designed to integrate the various theoretical aspects of, and techniques within, the field of separation science. The unifying features are the fundamental physical processes governing the separation process. The theory of the mass transport phenomena underlying all separation processes will be presented. The factors enhancing and limiting the separation power of specific separation techniques will then be discussed using this theoretical background. Practical information regarding gas and liquid chromatography columns and instruments as well as systems and instruments for electro-driven separations will be presented. The development and optimization of methods using specific chromatographic techniques will be discussed. Recent developments and research in separation science, including the development of novel materials, will be presented.

Course Goals and Learning Outcomes

Students completing this course will gain a firm fundamental understanding of separation processes and methods, a practical understanding of the approaches to gain optimal separation performance from selected methods, and familiarity with current research and developments in separation science.

Topics:

Theoretical Fundamentals of Chemical Separation

1/13-3/6

Equilibrium: Driving Force for Selective Displacement

Selective Transport

Bulk Flow Transport and Viscous Phenomena

Retention and Selectivity in Column Chromatography (Poole Ch. 1)

Broadening and Resolution (Poole Ch. 1)

Midterm Exam 40%

Separation Methods, Materials, Method Development, and Practice 3/9-5/1
Gas Chromatography – Capillary Columns, Instrument Design (Poole Chs 2,3)
Liquid Chromatography – Packed Columns and Materials, Instrument Design (Poole Chs 4,5)
Electrokinetic Separations - Capillary Electrophoresis and Chromatography (Poole Ch. 8)
Supercritical Fluid Chromatography, Chiral Separations (Poole Chs 7,10)

Final Exam 40%

Research Paper (Due 5/1) 20%

Students with Disabilities If you are a student with a disability and wish to discuss reasonable modifications for this course, contact me privately to discuss the specific modifications you wish to request. Please be advised I may request that you provide a letter from Disability Services for Students verifying your right to reasonable modifications. If you have not yet contacted Disability Services, located in Lommasson Center 154, please do so in order to verify your disability and to coordinate your reasonable modifications. For more information, visit the Disability Services website at <http://www.umt.edu/disability>.

Important Dates Important dates and deadlines regarding registration for the fall semester can be found at <http://www.umt.edu/registrar/calendar.aspx>

Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University. Academic misconduct is defined as all forms of academic dishonesty. All of the academic policies found in the Student Conduct Code (http://life.umt.edu/vpsa/student_conduct.php) apply to this course.

Of particular relevance to this course, it is considered academic misconduct to represent another person's words, ideas, data, or materials as one's own. It is also considered academic misconduct to copy from another student's paper, consult unauthorized material, give information to another student or collaborate with one or more students without authorization during an examination or academic exercise without the instructor's permission.