

Department:

Chemistry

Course Description:

This course continues the study begun in CHM 111 and is intended for students going into technological, scientific, engineering, or medical fields. The course is required in certain pre-professional programs, such as pre-medicine, pre-veterinary medicine, pre-dentistry, etc. Course topics will include crystals and solids, reaction kinetics, chemical equilibrium, solution chemistry including acid-base and complex-ion equilibria, thermodynamics, and electrochemistry. The course will also include a brief discussion of organic chemistry, biochemistry, and nuclear chemistry.

Course Competencies:

The learning outcomes and competencies detailed in this syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups for this course as approved by the Kansas Board of Regents. (Kansas Regents Shared Number Course and Title: **KRSN Course CHM 1020/CHM 1021/CHM 1022 Chemistry II & Lab/Lecture/Lab.**)

Upon completion of this course, students will be able to:

1. Describe the effects of intermolecular forces in chemical systems and perform calculations involving solution concentrations and colligative properties.
2. Apply the concepts of chemical kinetics to evaluate rates and to describe the energetics and mechanisms of chemical reactions.
3. Apply and demonstrate an understanding of equilibrium concepts to predict qualitative and quantitative properties of a chemical system.
4. Define acids and bases and evaluate strengths using chemical equilibrium concepts.
5. Perform calculations involving pH, titrations, and buffers to describe acid/base and solubility equilibria.
6. Evaluate data and perform calculations involving thermodynamic quantities for a process, demonstrate the relationship between these quantities, and use the relationship to predict the spontaneity of chemical reactions.
7. Describe an electrochemical cell and utilize reduction potentials to predict the outcome of a given redox reaction.
8. Execute laboratory skills in accordance with proper laboratory and chemical safety practices.
9. Collect, evaluate, and interpret qualitative and quantitative data from laboratory procedures in a productive and meaningful manner.

Course Content:

- A. The chemistry of solids
- B. Organic chemistry: fuels and materials

- C. Thermodynamics: spontaneous processes, entropy, and free energy
- D. Chemical kinetics
- E. Chemical equilibrium
- F. Equilibrium in the aqueous phase
- G. Chemistry of transition metals
- H. Electrochemistry and electric vehicles
- I. Biochemistry: the compounds of life
- J. Nuclear chemistry

Learning Assessments:

Course competencies will be assessed by exams, quizzes, homework assignments, lab work and reports, and final exam.

Instructional Materials:

Textbook:

Davies, G., Foster, N., Gilbert, T. R., & Kirss, R. V. (2015). *Chemistry: The Science in Context* (4th ed.). New York, NY: W.W. Norton. ISBN: 978-0-393-91937-0

Laboratory manual:

CHM (PS 112) College Chemistry II HCC Custom Lab Manual, Pearson. ISBN: 978-1-323-86456-2

Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the "Disabilities Self-Identification Form" on our [Disability Services website](#).

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

A Note on Harassment, Discrimination and Sexual Misconduct

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an [online report](#) about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our [Equity Grievance Policy](#).