INDIANA UNIVERSITY

8/20/2018 – 12/10/2018
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CHEM-T540 Physical Chemistry

This course will touch on all the fundamental areas of Physical Chemistry. Emphasis is on content that expands the students' knowledge in the key areas and relates to concepts likely to be taught in introductory chemistry courses.

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

- Demonstrate expertise in Physical Chemistry
  - Break down and analyze fundamental physical chemistry concepts and processes
  - Design methodologies to teach fundamental physical chemistry concepts
- Demonstrate effective oral and written scientific communication skills
  - Retrieve information from chemical literature and critically analyze a journal article
  - Communicate scientific findings in written form
- Demonstrate application of the impact of Physical Chemistry on society
  - Analyze processes in everyday life using physical chemistry principles
  - Demonstrate an awareness of the impact of physical chemistry on the society

Course content:

The course will follow the molecular approach to physical chemistry, beginning with the quantum mechanical description of matter before proceeding to bulk properties.

- Quantum Mechanics
  - Historical background, postulates and general principles of the quantum mechanics
  - Schrodinger equation and a particle in a box
  - Atomic and molecular structure (chemical bonding)
  - Spectroscopy (Microwave, IR, NMR)
- Thermodynamics & Equilibrium
  - Equation of State, First & Second Laws of Thermodynamics
  - Thermodynamics in engines and refrigeration
  - Chemical Equilibrium
  - Thermodynamics of pure systems and mixtures
  - Phase equilibria
- Chemical Kinetics
  - Fundamentals of reaction rates, rate laws
  - Nonelementary reaction kinetics
  - Influence of reactor type, transport limitations and phase equilibria on reaction rates

Learning materials:

D. A. McQuarrie & J. D. Simon: Physical Chemistry- A Molecular Approach. 1st Ed.
Atkins and de Paula: Physical Chemistry. 10th Ed; I.N. Levin: Physical Chemistry. 6th Ed.

Assessment:

Weekly discussion forums (5 points each): 10%
Weekly Homework problems (10 points each): 20%
Literature Review & Discussions: 30%
Concept Paper: 10%
Exams: 30%