CHEMISTRY (CHEM)

CHEM 100 Introduction to Chemistry 3 sem. hrs.
This course is designed for students who have had little or no chemistry experience prior to attending Walsh. This course is mandatory for nursing-intended students who place in CHEM 100 following completion of the chemistry placement exam. This course provides the concepts and basic skill sets to help prepare students for Chem 109. Topics include the metric system; units; significant figures; factor-label calculations; density; atoms, molecules and ions; basic nomenclature of inorganic salts; balancing chemical reactions; mass-mole relationships; basic algebra; logarithms; basics of acid-base chemistry; basic chemical bonding; and an introduction to Lewis structures and VSEPR geometries. The course is taught at a pace to enable substantial repetition and skill development. The course is problem-solving intensive and all students must have a basic scientific calculator. A grade of C- or better in this course is required to enroll in CHEM 109. Offered every fall.

CHEM 101 FD:T1:Princ of Chemistry I 3 sem. hrs.
Principles of Chemistry I is designed to help students learn key concepts with skills in chemistry including data management; atoms, molecules and ions; chemical reactions and stoichiometry, gas behavior; thermochemistry, atomic theory & quantum mechanics, and chemical bonding. The course is taught using a combination of interactive lecture, chemical & multi-media demonstrations, group dynamics and problem solving. This course is intended for students who are chemistry or biology majors or education majors with a concentration in the sciences. Consequently, placement beyond MATH 104 is required, and a strong background in high school chemistry is very helpful. This course is offered every Fall semester. Taking the lab in conjunction with the course is highly recommended. 3 hours of lecture and one 3 hour lab per week. This course is offered every fall.

CHEM 101L Principles of Chemistry I: Lab 1 sem. hr.
This lab experience is designed to compliment Chem 101 lecture. A strong focus is placed on proper methods for measuring data (mass, volume, length, etc...), proper use of significant figures; basic statistical methods; graphing and data presentation; laboratory safety and proper scientific report writing. Experiments include, but are not limited to, determination of densities of materials; gravimetric analysis; volumetric analysis (acid-base titrations, etc...); quantitative analysis using spectrophotometry; calorimetry and other labs as time permits. For most experiments, students work independently, but teamwork is also encouraged in certain situations. One 3-hour lab period per week. Offered every fall.

CHEM 102 Principles of Chemistry II 3 sem. hrs.
Principles of Chemistry II continues to build on POC I. Topics include chemical bonding, molecular geometry, solution chemistry, chemical kinetics, equilibrium, acid-base chemistry, complex ions, thermodynamic state functions, electrochemistry and nuclear chemistry. This course emphasizes the integrated nature of chemistry and provides numerous practical applications of chemistry in materials science, medicine, pharmaceuticals and food science. A working knowledge of basic algebra, logarithms, and graphing is vital. Taking the lab in conjunction with the course is highly recommended. Offered every spring. Prerequisite: Successful completion of CHEM 101 with a C- or better.

CHEM 102L Principles of Chemistry II:Lab 1 sem. hr.
This lab experience is designed to compliment Chem 102 lecture. A strong focus is placed on proper methods for measuring data (mass, volume, length, etc...), proper use of significant figures, basic statistical methods, graphing and data presentation, laboratory safety and proper scientific report writing. Experiments include, but are not limited to, thin-layer chromatography of pharamaceuticals, colligative properties of solutions; chemical kinetics; chemical equilibrium; electrochemistry; more complex volumetric analysis; and qualitative chemical analysis. For most experiments, students work independently, but teamwork is also encoraged in certain situations. A greater emphasis is placed on exploratory and investigative science during this course. One 3-hour lab per week. Offered every spring semester.

CHEM 109 FD:T1:Gen Org/Biochem I 3 sem. hrs.
This course is specifically designed for students intending to pursue careers in nursing and related fields. This first course focuses on inorganic chemistry or general chemistry. Topics include: measurements; significant figures; metric system; units; density; atoms, molecules and ions; basic nomenclature of inorganic salts and simple diatomic covalent molecules; balancing chemical reactions; stoichiometry (mass-mole relationships); basic gas laws; basics of thermodynamics; acid-base chemistry; basics of chemical kinetics; basics of chemical equilibrium; periodic table; basics of chemical bonding; Lewis structures and VSEPR geometries; and basic of nuclear chemistry. A working knowledge of basic math including simple algebra is needed. This course is calculation intensive. All students need a scientific calculator. Taking the lab course (Chem 109L) in conjunction with this lecture course is highly recommended. A grade of C or better is required to enroll in CHEM 110. This course does not count toward the Chemistry or Biology major. Offered during fall, spring, and in summer I session every year.

CHEM 109L Gen Org/Biochem I/Lab 1 sem. hr.
This lab experience is designed to compliment Chem 109 lecture. A strong focus is placed on proper methods for measuring data (mass, volume, length, etc...), proper use of significant figures; basic statistical methods; graphing and data presentation; laboratory safety and proper scientific report writing. Experiments include, but are not limited to, determination of densities of materials; basic gravimetric analysis; volumetric analysis (acid-base titrations, etc...); separation of mixtures; calorimetry and other labs as time permits. For most experiments, students work independently, but teamwork is also encouraged in certain situations. Offered in the fall, spring, and summer I session every year.

CHEM 110L Gen Org/Biochem II: Lab 1 sem. hr.

CHEM 120 FD: Fundament.of Clinical Chem 4 sem. hrs.
T1: This introductory course will focus on a variety of clinical applications supported by concepts in chemistry. The course begins with metabolic panels including clinical normal ranges. This course will focus on therapeutic drug monitoring, emergency toxicology, and metabolic diseases. Other important concepts include metals in medicine, biochemistry in diagnosis, and alcohols in biochemistry. Radioisotopes in medicine and its applications will conclude this course. Group activities serve to supplement these topics and encourage critical thinking in chemistry. Students will demonstrate clinical knowledge and its applications to real-life situations. Offered every fall, spring and summer. No prerequisites

CHEM 198 Chemistry Seminar 1 sem. hr.
The seminar series introduces students to chemistry faculty and their research. Students will engage in active learning through the exploration of current chemistry topics. The course also introduces professional skills and culminates with a final presentation.

CHEM 200L Aspects of Clinical Chem:Lab 1 sem. hr.

CHEM 201 Organic Chemistry I 3 sem. hrs.
Fundamental concepts of molecular orbital theory, thermodynamics, kinetics. Introduction to molecular orbital theory structure, nomenclature, physical properties, thermodynamics, kinetics, preparation and reactions of alkanes, alkenes, alkynes, alcohols, ethers, epoxides, aldehydes and ketones. Other topics include stereochemistry, acids, bases, and reaction mechanisms. Molecular Spectroscopy (NMR, IR, UV-Vis, and Raman) are integrated throughout the course. Synthetic and mechanistic chemistry is emphasized. First semester of two semester sequence. Offered every fall semester. Co-requisite: CHEM 201L
Prerequisite: CHEM 101, 102, CHEM 101L, 102L, all "C-" or better.

CHEM 201L Organic Chemistry I: Lab 1 sem. hr.
Melting point determination, distillation, recrystallization, extraction, thin layer chromatography, and fundamentals of synthesis are introduced during the lab along with introduction to IR, MS, and NMR. First semester of two semester sequence. Offered every fall semester.
Prerequisite: CHEM 101, 102, CHEM 101L, 102L, all "C-" or better.

Co-requisite: CHEM 201.

CHEM 202 Organic Chemistry II 3 sem. hrs.
Continuation from CHEM 201/CHEM 208, including aromatic systems, carboxylic acids, carboxylic acid derivatives, amines, carbon-carbon bond-forming reactions, polymers, carbohydrates and amino acids. Molecular spectroscopy (NMR, IR, UV-Vis and Raman) are integrated throughout the course. Synthetic and mechanistic chemistry is emphasized. Second semester of two semester sequence. Offered every spring semester. Co-requisite: CHEM 202L
Prerequisite: CHEM 201/CHEM 208, and 201L, both with "C-" or better.

CHEM 202L Organic Chemistry II: Lab 1 sem. hr.
Planning and performance of organic syntheses and verification of molecular structure using IR, MS, and NMR, and various chemical tests are presented in the lab. One four-hour lab per week. Second semester of two semester sequence. Pre-requisite: CHEM 201/CHEM 208 and CHEM 201L, both "C-" or better. Offered every spring semester.
Corequisite: CHEM 202.

CHEM 208 Organic Chemistry I 2 sem. hrs.
Fundamental concepts of molecular orbital theory, thermodynamics, and kinetics. Introduction to molecular orbital theory structure, nomenclature, physical properties, thermodynamics, kinetics, preparation and reactions of alkanes, alkenes, and alkynes. Other topics include stereochemistry, acids, bases, and reaction mechanisms. Molecular Spectroscopy (IR and Mass Spectrometry) are integrated throughout the course. First course in a sequence of three courses. Offered every fall semester. Co-requisite: CHEM 201L
Prerequisite: CHEM 101, 102, CHEM 101L, 102L, all "C-" or better.

CHEM 209 Organic Chemistry II 2 sem. hrs.
Principles introduced in Chemistry 208 are used and expanded to study the chemistry of alkyl halides, alcohols, ethers, epoxides, pericyclic reactions, aldehydes, aromatics, and ketones. Molecular Spectroscopy (IR, NMR, UV-Vis, and Mass Spectrometry) are integrated throughout the course. Second course in sequence of three courses. Offered every fall and spring semester. Pre-requisite: CHEM 201/CHEM 208 and CHEM 201L, both "C-" or better.
Co-requisite: CHEM 202L.

CHEM 210 Organic Chemistry III 2 sem. hrs.
Principles introduced in Chemistry 208 and 209 are used to study the chemistry of polyfunctional compounds, carboxylic acid derivatives, enolates, natural products, lipids, carbohydrates, heterocyclics, and amino acids. An introduction to membranes, macromolecular conformations, and supramolecular architecture with also be studied. Molecular Spectroscopy (IR, NMR, UV-Vis, and Mass Spectrometry) are integrated throughout the course. Third course in sequence of three courses. Offered every spring semester. Pre-requisite: CHEM 202/ CHEM 209 and CHEM 202L, both "C-" or better.

CHEM 221 Essentials of Organc Chemistry 4 sem. hrs.
This four-hour lecture course is a one-semester survey of organic chemistry intended for students that are not chemistry or biology pre-professional majors, or for students needing an overview of organic compounds, functional groups, and reactions. The course will cover the basics of valence bond theory including hybrid orbitals and resonance, the structure and chemical behavior of aliphatic and aromatic hydrocarbons, organohalides, alcohols, thiols and ethers, aldehydes and ketones, amines, carboxylic acids and derivatives and heterocyclic compounds. Stereochemistry, IR spectroscopy and NMR spectrometry basics will also be covered. Basic reaction mechanisms and molecular sythesis will be covered and applications of organic compounds in materials science, pharmaceuticals, biochemicals and fuels will be emphasized.
Prerequisites: CHEM 101, CHEM 101L, CHEM 102, CHEM 102L.

CHEM 301 Quantitative Analysis 3 sem. hrs.
Introduction to the use of statistics in chemistry along with the studyof gravimetric and volumetric methods of analysis are presented. Principlesand applications of chemical equilibria, acid-base reactions, solubilityand precipitation, complexion formation, and redox reactions are covered. Pre-requisite: CHEM 101, 101L, 102, 102L, all "C-" or better. This course will no longer be offered following the 2015-2016 academic year.
Co-requisite: PHYS 101, 101L, 102, 102L and CHEM 301L.

CHEM 301L Quantitative Analysis: Lab 1 sem. hr.
Statistical analyses are performed and presented. The studies of gravimetricand volumetric methods of analysis are practiced. Creating acid-base, metal, and EDTA titration curves are also practiced. This course will no longer be offered following the 2015-2016 academic year.
Prerequisite: CHEM 101, 101L, 102, 102L, all "C-" or better.

Co-requisite: PHYS 101, 101L, 102, 102L and CHEM 301.

CHEM 302 Instrumental Analysis 3 sem. hrs.
Theoretical and practical principles of chemical analysis involving useof electronics, atomic spectroscopy, molecular spectroscopy, and separationmethods are discussed. This course will no longer be offered following the 2015-2016 academic year.
Prerequisites: CHEM 101, 101L, 102, 102L, all "C-" or better.

Co-requisite: PHYS 101, 101L, 102, 102L and CHEM 302L.

CHEM 302L Instrumental Analysis: Lab 1 sem. hr.
Theoretical and practical principles of chemical analysis involving useof electronics, atomic spectroscopy, molecular spectroscopy, and separationmethods are practiced. This course will no longer be offered following the 2015-2016 academic year.
Prerequisites: CHEM 101, 101L, 102, 102L, all "C-" or better.

Co-requisite: PHYS 101, 101L, 102, 102L and CHEM 302.

CHEM 303 Modern Analytical Chem 3 sem. hrs.
This course will focus on classical and modern methods of chemical analysis. Data management, "wet" methods and instrumental methods of analysis will be explored with applications in various areas of chemistry including materials science, organic synthesis, structure characterizations, and many others. Offered fall on odd-numbered years.
Prerequisites: CHEM 101 and 101L, CHEM 201/CHEM 208, CHEM 202/CHEM 209, CHEM 210, CHEM 201L and CHEM 202L.

CHEM 303L Modern Analytical Chem Lab 1 sem. hr.
This lab will complement the CHEM 303 course and will involve hands on experience with gravimetric, volumetric and instrumental methods of analysis in chemical problem solving. Offered fall semester on odd-numbered years.
Prerequisites: CHEM 101 and 101L, CHEM 201/CHEM 208, CHEM 202/CHEM 209, CHEM 210, CHEM 210L and CHEM 202L.

CHEM 305 TH2:CIT:Inorganic Chemistry 3 sem. hrs.
This course presents fundamental theories and applications of the chemistry of inorganic compounds, particularly the main-group elements. Topics include theories in chemical bonding, hard-soft theory, chemistry of the main-group elements, inorganic rings, inorganic and organic polymers, anticancer drug delivery, solid state chemistry, solution chemistry, organometallic chemistry, green inorganic chemistry, materials and products, and the medical applications of inorganic molecules. This course also includes an oral and writing component, integration of research literature, application of course content to realistic situations, synthesizing research findings and case studies, and interactive activities and group discussions. Students are expected to read, abstract, and present current topics in inorganic chemistry. Offered spring of every odd-numbered year.
Prerequisite: CHEM 201-202 with a C- or better grade.

CHEM 305L Inorganic Chemistry:Lab 1 sem. hr.
This lab experience is designed to complement CHEM 305 lecture. The focus is the manipulation and synthesis of inorganic compounds. Topics include the chemistry of phosphazenes, silanes, materials chemistry, and inorganic polymers. Students will gain knowledge of anaerobic techniques for air-sensitive compounds. Offered spring of every odd-numbered year.
Prerequisite: CHEM 208 and CHEM 209 with a C- or better grade.

CHEM 307 Essential Biochemistry 3 sem. hrs.
This course focuses on the structure, chemistry and biological functions of some of the primary biomolecules: proteins, lipids, saccharides, nucleic acids, and vitamins & coenzymes. The course then focuses on fundamentals of enzymology, central catabolic metabolism and key features of biochemical regulation and integration. Applications of biochemistry in medicine and pharmaceuticals are also emphasized.The course is taught using a combination of interactive lecture, demonstrations and group activities. Offered every spring semester.
Prerequisites: CHEM 201/CHEM 208 and CHEM 202/CHEM 209.

CHEM 307L Essential Biochemistry:Lab 1 sem. hr.

CHEM 310 Found of Physical Chem 4 sem. hrs.
The study of physical chemistry involves investigating the interactions of matter at the most basic level. The semester will start with exploring states of matter and relating the physical properties of matter to the intermolecular interactions that dictate the behavior of gases, liquids, and solids. The second part of the course focuses on the exchange of energy during chemical processes and using the laws of thermodynamics to understand chemical systems at equilibrium and spontaneity. The topics covered will be thermochemistry, chemical equilibrium, phase equilibrium, and solution chemistry. The third emphasis of the course, kinetics is the study of how reactions proceed to equilibrium and the knowledge of the rates of reactions can be used to understand the mechanism of chemical reactions. Physical chemistry is a quantitative and theoretical study of the properties and structure of matter. Students need to be familiar with basic integral and differential calculus.

CHEM 320L Biochemistry I:Lab 1 sem. hr.

CHEM 321 Biochemistry II 3 sem. hrs.
This course is a continuation of CHEM 320 course with an emphasis on the metabolism of carbohydrates, lipids, and proteins in physiological systems. The metabolic pathways are examined from an integrated thermodynamic and kinetic regulatory perspective. Cellular signaling, metabolic disorders, and the role of ATP, and its production are fully considered. Applications of biochemistry in medicine and pharmaceuticals are also emphasized. Special discussion is placed on important biochemistry research topics during the latter part of the semester forwhich much material is drawn from the current biochemical literature. This course provides the linkage between the inanimate world of molecular biochemistry and the living world of biology. This course is required for Biochemistry majors and most pre-pharmacy students. All pre-professional students, biology majors and chemistry majors are welcome to enroll. Cross-listed as BIO 321. Offered every spring semester on even numbered years.
Prerequisites: CHEM 320.

CHEM 321L Biochemistry II:Lab 1 sem. hr.

CHEM 390 DV:Chemistry Internship 3 sem. hrs.
This course offers credit for doing an internship in chemistry with our business partners. This seminar is for Chemistry majors. Offered every fall and spring semesters.

CHEM 390A DV: Chemistry Internship 3 sem. hrs.
This course offers credit for doing an internship in chemistry with our business partners. This seminar is for Chemistry majors. Offered every fall and spring semesters.

CHEM 390B DV: Chemistry Internship 3 sem. hrs.
This course offers credit for doing an internship in chemistry with our business partners. This seminar is for Chemistry majors. Offered every fall and spring semesters.

CHEM 398 Premier Skills/Professionalism 1 sem. hr.
This course explores the fundamental principles of professionalism, leadership, and ethics within various professional environments. Students will explore essential topics such as Ethics and Professionalism, where they will learn the standards and behaviors expected in the workplace. The course covers Soft Skills and Emotional Intelligence, emphasizing the importance of self-awareness and interpersonal skills in professional settings. Effective Communication and Collaboration strategies will be examined to enhance teamwork and productivity. Leadership and Situational Management will equip students with the ability to adapt their leadership style to different scenarios. Conflict Management techniques will be discussed to resolve disputes effectively. Finally, the course addresses Ethics in Emerging Technologies, focusing on the ethical implications of technological advancements. Case studies will be used throughout to provide real-world context and application.

CHEM 401L Physical Chemistry I: Lab 1 sem. hr.

CHEM 402L Physical Chemistry II: Lab 1 sem. hr.

CHEM 403 Clinical Biochemistry 3 sem. hrs.
Clinical Biochemistry is concerned with the detection and measurement of biochemical changes in disease. This course focuses on the areas of body function required for the maintenance of health including: carbohydrates metabolism, transport and storage of lipids and lipoproteins, acid-base balance and blood gases as well as control of water and electrolytes and kidney function. Genetic control is covered with an emphasis on endocrinology including thyroid hormones. The course also includes a discussion of digestion, nutrition, and drugs, in addition to, liver function, relevant enzymology and the immune system. This course is suitable for students interested in careers in biochemistry, chemistry, biology, medicine, dentistry, pharmacy, and veterinary. Cross-listed as BIO 403 Offered every fall on even-numbered years.
Prerequisites: BIO/CHEM 320, BIO/CHEM 321 or BIO/CHEM 307.

CHEM 403L Biochemistry I:Lab 1 sem. hr.

CHEM 404 Physical Biochemistry 3 sem. hrs.
Physical Biochemistry aims at understanding biological systems and processes in terms of the underlying physical and chemical laws. The course quantitatively investigates the interactions, dynamics, and structure of biological molecules at the molecular level in terms of kinetics, thermodynamics, spatio-temporal organization. Cross-listed as BIO 404.
Prerequisite: MATH 210A.

Corequisite: MATH 210A.

CHEM 407 Molecular Pharmacology 3 sem. hrs.
This course deals with the biochemistry and physiology of drugs and their effects on living systems. As is the case with the science of pharmacology, the interactions of drugs with cellular targets are used as a means to understand normal cellular functions. We will deal with common over-the counter medications, prescription medications, antibiotics, drugs acting on the central nervous system, drugs of abuse, and new approaches to drug therapy. Three hours of lecture per week. Offered every spring semester.
Prerequisites: CHEM 201/CHEM 208, CHEM 202/CHEM 209 and CHEM 210.

CHEM 411 Introduction to Research 1,2 sem. hrs.
Intended for advanced students, course includes methods for searching the chemical literature and using the library. A two-semester research project will be discussed and assigned. Research projects typically involve advanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Division Chair and Vice President for Academic Affairs. A maximum of 2 credits can be applied to the CHEM major or minor. Offered every semester.

CHEM 411A Introduction to Research 1-2 sem. hrs.
Intended for advanced students, course includes methods for searching the chemical literature and using the library. A two-semester research project will be discussed and assigned. Research projects typically involve advanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Division Chair and Vice President for Academic Affairs. A maximum of 2 credits can be applied to the CHEM major or minor. Offered every semester.

CHEM 411B Introduction to Research 1-2 sem. hrs.
Intended for advanced students, course includes methods for searching the chemical literature and using the library. A two-semester research project will be discussed and assigned. Research projects typically involve advanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Division Chair and Vice President for Academic Affairs. A maximum of 2 credits can be applied to the CHEM major or minor. Offered every semester.

CHEM 412 Introduction to Research 1,2 sem. hrs.
Intended for advanced students, course includes methods for searchingthe chemical literature and using the library. A two-semester researchproject will be discussed and assigned. Research projects typically involveadvanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Division Chair. A maximum of 2 credits can be applied to the CHEM major or minor.

CHEM 415L Integrated Lab Experience I 2 sem. hrs.
The integrated laboratory experience is to provide a comprehensive laboratory experience using a project-based learning paradigm. Students will study and address socially and technologically relevant problems that span across the traditional sub-disciplines of chemistry - such as recycling and waste management, creating new materials with novel properties, and energy storage. Students will design chemical systems and experiments to study fundamental concepts and address a specific issue by implementing aspects of chemical synthesis, physical and chemical characterization, and modeling. The emphasis of the course will be for students to coalesce material from lecture courses in analytical, inorganic, organic, and physical chemistry while working on laboratory projects.

CHEM 416L Integrated Laboratory Exp II 2 sem. hrs.
This course is the extension of CHEM 415L.

CHEM 416LA Integrated Laboratory II 1 sem. hr.
This course is the extension of CHEM 415L.

CHEM 416LB Integrated Laboratory II 1 sem. hr.
This course is the extension of CHEM 415L.

CHEM 417L Integ Lab Experience III 2 sem. hrs.
This course is the extension of CHEM 416L.

CHEM 440 NMR Theory & Applications 3 sem. hrs.
This course emphasizes the fundamental aspects of 1D and 2D nuclear magnetic resonance spectroscopy (NMR). The theory of pulsed Fourier transform NMR is presented using a conceptual nonmathematical approach. The course is geared toward an audience which seeks an understanding of NMR theory and an appreciation of the practical applications of NMR in chemical analysis. Students are exposed to hands-on NMR operation. Detailed instructions are provided and eachstudent is expected to carry out his or her own NMR experiments onour Anasazi EFT-60 NMR spectrometer.

CHEM 450 Environmental Chemistry 3 sem. hrs.
This course will explore methods of chemical analysis in environmentalapplications related to EPA standards, environmental toxicology, product safety issues and exposure limits. Offered every spring.
Prerequisites: CHEM 101, 101L, 102, 102L.

CHEM 460 Materials Chemistry 3 sem. hrs.
The study of materials chemistry involves investigating the relationship between processing, structure, properties, and performance of solid-state materials as related to the main classifications of solids (metals, ceramics, polymers, and composites) as well as advance materials (semiconductors, responsive materials, and nanomaterials). The semester will start with a discussion of solid-state materials (types, bonding, and crystal structure) and its properties. Afterwards, the effect of defects and imperfections on the materials properties. The second part of the course will focus on transformations and processing of materials. Once the basis for solid materials has been investigated a detailed discussion of the main types of materials and their properties will follow. The semester will end with selected topics of advanced materials.

CHEM 470 Nano and Fuel Chemistry 3 sem. hrs.
Fuels and Energy Chemistry is an application-focused course designed to help students apply their knowledge to a current societal issue: meeting our future energy needs. The course takes a system-centric approach to understand energy technology at the global, device, and molecular level. The course begins with an introduction to the global energy system, followed by in-depth investigations into three technologies: combustion, solar cells, and energy storage. The semester ends with a look towards our future energy needs. Students apply their thermodynamics, kinetics, and electrochemistry knowledge to understand how stored chemical energy can be harnessed and they use their knowledge of chemical structure, activity, and phenomenon to understand energy devices at the molecular level.