College of Science & General Studies Academic Departments

DEPARTMENT OF CHEMISTRY

Chair

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General Department Information:

The Department of Chemistry seeks to be nationally and internationally recognized for its excellence in education, interdisciplinary research, and services. The department strives toward becoming a leading source of knowledge in the chemical and biochemical sciences and their multifaceted practical applications. We are committed to educating and preparing our students to excel and achieve their goals. Our faculty members are respected scholars in their fields, as well as dedicated teachers and mentors. Under the guidance of our faculty members, students have the opportunity to conduct cutting-edge research and to gain hands-on experience with modern instrumentations.

The Chemistry Department serves the local community and the Kingdom by offering world-class education, providing scientific leadership, training future leaders chemical and biochemical sciences, and by engaging in community services.

Chemistry Course Descriptions

CHM 101 General Chemistry I

Cr Hr: 3 Prerequisite: None Co-requisite: CHM 101 L

CHM 101 is the first-semester course of a two semesters General Chemistry sequence for students majoring in science or preparing for entry into health professional programs such as medicine, dentistry, pharmacy and veterinary science. CHM 101 provides a comprehensive introduction to the basic principles of chemistry, including atomic and molecular structure, properties of gases, liquids and solids, and chemical thermodynamics.

CHM 101 L General Chemistry I lab

Cr Hr: 1 Co-requisite: CHM 101

General Chemistry I Lab provides an introduction to the fundamentals of laboratory techniques in chemistry. Students will carry out measurements, prepare solutions, and perform qualitative and quantitative experiments.

CHM 102 Introduction to Chemistry

Cr Hr: 3 Prerequisite: None Co-requisite: CHM 102 L

CHM 102 is a single-semester, terminal course designed to provide engineering students with a foundation in the fundamental principles and concepts of chemistry. Topics covered include atomic structure, nomenclature, chemical equations, stoichiometry, thermochemistry, chemical bonding, solution properties, kinetics, equilibrium, electrochemistry, descriptive inorganic, nuclear chemistry, and bio/organic chemistry.

CHM 102 L Introduction to Chemistry lab

Cr Hr: 1 Co-requisite: CHM 102

Introduction to chemistry lab provides an introduction to the fundamentals of laboratory techniques in chemistry. Students will carry out measurements, prepare solutions, and perform qualitative and quantitative experiments.

CHM 107 Chemistry in the Environment and Everyday Living

Cr Hr: 3 Prerequisite: None

CHM 107 examines the role of chemistry in everyday life and the environment, and is intended for students not pursuing scientific or engineering majors. Chemical principles are introduced to the extent necessary for an understanding of issues.

CHM 112 General Chemistry II

Cr Hr: 3 Prerequisite: CHM 101 or CHM 102 Co-requisite: CHM 112 L

CHM 112 is the second of a two-semester chemistry course for science majors or those preparing for entry into health professional programs such as medicine, dentistry, pharmacy and veterinary science. CHM 112 builds on fundamental principles mastered in the first semester of the course.

CHM 112 General Chemistry II lab

Cr Hr: 1 Co-requisite: CHM 112 L

The general Chemistry II Lab (CHM 112 L) is designed to support and illustrate chemical concepts studied in the lecture portion of the course, as well as to introduce important laboratory techniques and encourage analytical thinking.

CHM 211 Organic Chemistry I

Cr Hr: 3 Prerequisite: CHM 112 Co-requisite: CHM 211 L

CHM 211 is the first semester of a two semester sequence for science majors and those preparing for entry into health professional programs such as medicine, dentistry, pharmacy and veterinary science. CHM 211 focus on bonding principles, functional groups, isomerism, stereochemistry, nomenclature, synthesis and reactions of alkanes, cycloalkanes, alkenes, alkynes, alcohols, and alkyl halides. Addition, elimination, rearrangement, and substitution mechanisms.

CHM 211 L Organic Chemistry I lab

Cr Hr: 1 Co-requisite: CHM 211

Organic chemistry I Lab provides an introduction to the fundamentals to laboratory techniques in organic chemistry. This lab introduces students to chemical reactions and syntheses of aromatic, carbonyl, and amine compounds.

CHM 212 Organic Chemistry II

Cr Hr: 3 Prerequisite: CHM 211 Co-requisite: CHM 212 L

CHM 212 is a continuation of CHM 211. It covers nomenclature, properties, reactions and synthesis of conjugated dienes, aromatics, organometallics, alcohols, phenols, ethers, aldehydes and ketones, carboxylic acids and derivatives, and amines. Mechanisms include electrophilic aromatic substitution and nucleophilic addition. Carbohydrates, amino acids, proteins and nucleic acids

CHM 212 L Organic Chemistry II lab

Cr Hr: 1 Co-requisite: CHM 212

Organic chemistry II Lab (CHM 212 L) introduces students to chemical reactions and syntheses of aromatic, carbonyl, and amine compounds. Special topics in carbohydrate, amino acid, and lipid chemistry. Lab work includes simple and multi-step synthesis and spectral identification.

CHM 213 Analytical Chemistry

Cr Hr: 3 Prerequisite: CHM 112

Quantitative Analysis (CHM 213) provides a comprehensive introduction to the fundamental theory and laboratory techniques in analytical chemistry. This includes experimental errors and statistics, data analysis methods, chemical equilibria, titrations, spectrophotometry, and analytical separation methods.

CHM 232 Organic Chemistry

Cr Hr: 3 Co-requisite: CHM 232 L

CHM 232 provides the students with the essential knowledge required to define organic compounds and understand their properties, structures and actions. The students will determine the chemical structure using IR, NMR, and Mass Spectroscopy. The mechanisms of organic reactions, including addition, elimination, substitution, and rearrangement reactions will be discussed. Major organic chemical reactions covered in this course will help students understand subjects such as pharmacology and medicinal chemistry in the coming semesters.

CHM 232 L Organic Chemistry lab

Cr Hr: 1 Co-requisite: CHM 232

Organic chemistry Lab provides an introduction to the fundamentals to laboratory techniques in organic chemistry. This includes chemical reactions and syntheses of aromatic, carbonyl, and amine compounds discussed in CHM232 course.

CHM 310 Introduction to Instrumental Analysis

Cr Hr: 3 Prerequisite: CHM 212 Co-requisite: CHM 310 L

Introduction to the theories of analysis by instrumental methods. Basic electronics are applied to chemical measurements. Topics include an introduction to the theory of spectroscopy, ultraviolet, visible, infrared, and others. CHM 310 is an introduction to basic principles and the instrumental design of a variety of analytical techniques, including electrochemical, spectrochemical (molecular and atomic), chromatographical and mass spectrochemical techniques.

CHM 310 L Introduction to Instrumental Analysis lab

Cr Hr: 1 Co-requisite: CHM 310

Introduction to Instrumental Analysis lab (CHM 310 L) will introduce the basic analysis utilizing different instruments such as UV-visible spectrophotometer, IR, NMR, GC, HPLC, Potentiostat, and equipment relevant to the materials of CHM 310 course.

CHM 331 Medicinal Chemistry

Cr Hr: 3 Prerequisite: CHM 212

Medicinal Chemistry (CHM 331) will explore the role of chemistry in the design and action of drugs. Principles of drug discovery, drug development, drug interactions, and the structure-activity relationship of drugs will be discussed. Aspects of biochemistry and physical chemistry will be covered as required to understand the chemistry of drug action and drug metabolism. Selected case studies from the major classes of drugs and literature will be used to illustrate concepts covered in the course.

CHM 320 Physical Chemistry

Cr Hr: 3 Prerequisite: CHM 212

Physical chemistr (CHM 320) focuses on the molecular approach of the fundamentals of physical chemistry for life science students. It will help to explain many scientific phenomena such as: molecular structures, molecular spectroscopy, the applications of statistical thermodynamics and the motion and dynamics of molecules.

CHM 332 Environmental Chemistry

Cr Hr: 3 Prerequisite: CHM 112 and CHM 211

The purpose of this course is to gain an understanding of the fundamental chemical and biochemical processes that are occurring in the environment. The course will reflect on major issues in the environment, including atmospheric chemistry, air pollution, climate change, energy, water chemistry and water pollution, toxic heavy metals, organic pollutants such as pesticides, herbicides, insecticides, and waste and recycling.

SCI 310 Forensic Science

Cr Hr: 3 Prerequisite: ENG112 (or ENG113)

This single-semester elective course is designed to provide students with a foundation in the fundamental principles and concepts of forensic sciences. This course introduces the theory, concepts and practices used in the analysis of physical evidence performed in forensic laboratories, the fundamentals of crime scene investigation, forensic DNA analysis, illicit drugs, and forensic toxicology, hair and textile analysis, firearms and ballistics, and counterfeiting and forgery. In addition, selected case studies in different forensic disciplines will be discussed.

ENV 205 Environmental Science & Sustainability

Cr Hr: 3 Prerequisite: CHM 112

This course is general in nature that provides a general introduction to environmental issues and sustainable development. It surveys the impacts that humans have on the environment such as pollution, climate changes, loss of agricultural land, etc. It reviews the principles of sustainability and their applications to energy, climate change, urban planning, transportation, water use, etc. The course will also address changes and steps that can be made to promote sustainability. Current environmental issues will be discussed to motivate students to be active members of society for enhancing environmental awareness and in taking action to address environmental issues and sustainability in KSA.

ENV 310 Environmental Toxicology

Cr Hr: 3 Prerequisite: ENV 205

Environmental toxicology is an elective course focusing on the study of toxic effects of environmental chemicals on living organisms (including humans). In this course, the basic concepts, methods, and approaches in environmental toxicology will be introduced. Natural and synthetic chemicals commonly encountered in the air, water, and soil will be discussed regarding their occurrence, fate and transport, and toxicological effects on ecological species and humans. Case studies will be used to illustrate the complexity of environmental toxicology issues. New trends in chemical toxicity testing will be discussed. Contaminants of emerging concerns such as pharmaceutical and personal care products and engineered nanomaterials will also be introduced.

ENV 315 Earth Systems

Cr Hr: 3 Prerequisite: ENV 205

This course focuses on the profound transformation of Earth's environment that is now apparent, a transformation owing not to the great forces of nature or to extraterrestrial sources but to the numbers and activities of people – the phenomenon of global change. This course sets out what is known about global change and the nature of the Earth System.

ENV 330 Energy & Sustainability

Cr Hr: 3 Prerequisite: ENV 205

This course will help students to understand the critical relationships of the environment, energy, and sustainability. Leading experts provide comprehensive coverage of each topic, bringing together diverse subject matter by integrating theory with engaging insights. This course fills an information gap in energy, environment, and sustainability, presenting broad overviews of energy challenges and solutions along with the materials advances needed to enable rapid progress. The purpose of this course is to serve as a college-level that brings together the themes of environment and energy in the context of defining the issues, and subsequently focuses on the materials science and research challenges that need to be met.

ENV 410 Environmental Monitoring

Cr Hr: 3 Prerequisite: CHM 310

This course will cover introduction to environmental science, pollutants including chemical and biological and industrial hygiene. This will includes evaluating the various sampling techniques, pollutants and analytical techniques which can contaminate water, soil/surfaces and outdoor/indoor air. Furthermore, it will emphasize on environmental pollutants detection, hazards controlling, risk reduction, selection of the appropriate instrumentation techniques, calibration, quality control and reporting.

ENV 420 Waste Management

Cr Hr: 3 Prerequisite: ENV 205

This course covers the principles of waste management. It provides an overview of municipal waste, industrial waste, and hazardous waste management including design and economic analysis. Reviews physical, chemical, biological treatment of hazardous waste, and the innovative management practices associated with different waste. Students will be exposed to real world settings through worked examples, case studies, and field trips to water and solid waste management facilities. Case studies for specific industries like petrochemicals, fertilizers, desalination and petroleum refining, etc.

ENV 425 Environmental Policy & Economics

Cr Hr: 3 Prerequisite: ENV 205

This course explores the proper role of government in the regulation of the environment. It will help students develop the tools to estimate the costs and benefits of environmental regulations. These tools will be used to evaluate a series of current policy questions, including: Should air and water pollution regulations be tightened or loosened? What are the costs of climate change in the U.S. and abroad? Is there a "Race to the Bottom" in environmental regulation? What is "sustainable development"? How do environmental problems differ in developing countries? Are we running out of oil and other natural resources? Should we be more energy efficient? To gain real world experience, the course is scheduled to include a visit to the ministries and government institutions in KSA. We will also do an in-class simulation of discussions for and against specific case scenarios.

BSN 430 Nanomaterials & Nanotechnology

Cr Hr: 3 Prerequisite: CHM 310

The course is designed to introduce students to the emerging area of nanomaterials and nanotechnology. The course intends to prepare and train students in the evolving areas of nanoscience and nanotechnology which lies at the interfaces of chemistry, physics, and biology. It will cover the basic fundamentals of Nanoscience and Nanotechnology including properties of nanomaterials, nanoscale phenomena, synthesis and fabrication, and characterization of nanomaterials. In addition, the emerging and potential applications of nanomaterials will be reviewed with more focus on applications related to life sciences.

DEPARTMENT OF ENGLISH

Chair

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General Department Information

The English department exists to help Alfaisal students to be well-known for their dynamic critical thinking and communication skills as they interact across cultures and organizations. The first-year composition sequence takes a rhetorical approach to academic writing. Students begin by learning rhetorical analysis and then learn how to make effective choices as they compose their own arguments. The second semester emphasizes research, and students compose a full-length research report. This first year of reading, writing, analyzing, and researching prepares students for success in higher-level English electives as well as academic writing assignments across the curriculum. For second-year students, there are ESP courses designed to match their specific needs as they begin more advanced work in their chosen fields.

ENG 101 Freshman English I

Cr Hr: 3 Prerequisites: none

A skills-based, writing-intensive course, English 101 develops the student's abilities to organize, visualize and write effective essays that use advanced rhetorical strategies needed for success in academic pathways. The course covers the writing process, oral and written rhetorical techniques, and grammatical elements specific to a variety of genres. Students will explore and analyze how language is used to achieve communicative goals common to

academic writing in various genres through in-class writing activities, lectures, and homework assignments. This English course is a prerequisite to English 112 and counts toward partial fulfillment of the General Education requirements at Alfaisal University.

ENG 102 Freshman English I

Cr Hr: 2 Prerequisites: none

A skills-based, writing-intensive course, English 102 develops the student's abilities to organize, visualize and write effective essays that use advanced rhetorical strategies needed for success in academic pathways. The course covers the writing process, oral and written rhetorical techniques, and grammatical elements specific to a variety of genres. Students will explore and analyze how language is used to achieve communicative goals common to academic writing in various genres through in-class writing activities, lectures, and homework assignments. This English course is a prerequisite to English 113 and counts toward partial fulfillment of the General Education requirements at Alfaisal University.

ENG 112 Freshman English II

Cr Hr: 3 Prerequisites: ENG 101

As a continuation of ENG 101, ENG 112 focuses on developing the student's abilities to develop, organize, and effectively support arguments by incorporating primary and secondary research. The course continues to strengthen the writing process and the oral and written rhetorical moves and grammatical elements relevant to research genres. Students will explore and analyze how language is used to achieve communicative goals common to academic writing in these papers, through in-class writing activities, lectures, discussions, digital fora, and homework assignments. This English course is a prerequisite to ENG 222, and counts as a General Education requirement at Alfaisal University.

ENG 113 Freshman English II

Cr Hr: 2 Prerequisites: ENG 102

As a continuation of ENG 102, ENG 113 focuses on developing the student's abilities to develop, organize, and effectively support arguments by incorporating primary and secondary research. The course continues to strengthen the writing process and the oral and written rhetorical moves and grammatical elements relevant to research genres. Students will explore and analyze how language is used to achieve communicative goals common to academic writing in these papers, through in-class writing activities, lectures, discussions, digital fora, and homework assignments. This English course is a prerequisite to ENG 224, and counts as a General Education requirement at Alfaisal University. It is for medical students only.

ENG 222 Technical Writing

Cr Hr: 3 Prerequisites: ENG 101 and 112

In 21st century professional settings, writers are expected to produce a wide range of texts using different media. Because every technical writing situation is unique, this course will help students adapt their communication for different audiences, purposes, and environments. Creating a shared critical vocabulary will allow students to make well-informed choices in the technical writing they produce in their own pathway studies. While this course emphasizes writing, it also helps students develop the reading, listening, and speaking skills necessary to communicate effectively in a variety of workplaces, and it balances a theoretical approach with practical and extra-curricular means of learning. This course counts for a Humanities course in the University's General Education Requirements.

ENG 224 English for Medical Students

Cr Hr: 2 Prerequisites: ENG 102 and 113

ENG 224 (English for Medical Students) aims to develop fluency and confidence in using English in medical contexts. It also aims to increase EFL medical students' familiarity with medical written language and discourse in different medical contexts. The focus is on carrying out specialized activities in English, but attention is given to reading comprehension skills.

ENG 231 Medical Terminology

Cr Hr: 2 Prerequisites: none

Medical terminology is the study of the principles of building clinical terms used in health care professions. Students will be guided through this with a study of the roots, suffixes, and prefixes. Etymologies of words will also be emphasized. The course will cover the basic anatomy and function of the body's systems. There will be limited attention to pathology of disease.

ENG 301 Communication for Leaders

Cr Hr: 3 Prerequisites: a 200-level ENG course

This course explores the connection between language and effective leadership. Students will explore how leaders can use language to inspire, persuade, and influence their employees and followers, as well as how language can shape the image of leadership. Through analysis of various communication strategies and case studies of successful leaders, students will develop an understanding of the importance of discourse in leadership. Topics covered include rhetoric, communication styles, negotiation strategies, cultural differences in communication, and the use of language in crisis management. The course includes both theoretical and practical components, with opportunities for students to apply concepts through role-plays and group activities.

ENG 302 Artificial Intelligence and Digital Media

Cr Hr: 3 Prerequisites: a 200-level ENG course

New technologies are constantly making our communication tasks both easier and more complicated. Students will learn about a variety of digital media resources for communication. They will become familiar with AI-driven communication tools, including ChatGPT, social media algorithms, speech analysis, chatbots, and many other tools. Interactive class discussions as well as firsthand exploration of these tools will help students understand the incredible power as well as the challenges and limitations of using digital media and artificial intelligence for communication.

ENG 401 UX Research: Bridging Audience and Design

Cr Hr: 3 Prerequisites: a 300 level ENG course

Companies are increasingly using ethnographic methods as a cutting-edge way to collect information about user experience. This course introduces students to ethnographic methods as applied to business and industry. Students will develop tools necessary to collect, analyze, and interpret user data in a way that empowers companies to deliver better products and experiences to their target audiences.

ENG 402 Advanced Seminar in Communication

Cr Hr: 3 Prerequisites: a 300 level ENG course

This seminar will be a rotating list of topics, but will place a strong emphasis on oral communication, including presentations, meetings, and interviews. In an EdWeek article, "good oral communication skills got the #1 slot among the 15 job skills that executives and hiring managers identified as very important in new hires." Public speaking is an essential element of success in most jobs; yet it is often people's greatest fear. This course focuses on reducing fear by helping students learn, step by step, how to prepare and deliver engaging and persuasive presentations in both small and large group settings. Students also learn how to integrate audiovisual components effectively for maximum audience impact. The course's primary focus will be the preparation and delivery of presentations.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Chair

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General Department Information:

The Department of Humanities and Social Sciences is the backbone of the different university colleges. It offers both General Educational Requirements, including Arabic, Islamic studies, and a wide range of free elective courses in anthropology, philosophy, psychology, history and foreign languages. In addition, the Department contributes to humanities and social sciences research and supports the college and university mission in serving the community.

Humanities and Social Sciences Course Descriptions

ISL 101 Islamic Studies I

Cr Hr: 2 Prerequisite: None

Introduces Islamic culture and stresses its importance and contribution to humanity. It presents Sharia Law in terms of sources, underpinnings, and objectives. It also enhances students' faith in the viability of Sharia Law and its all-inclusiveness. The course counts as a social science component of the university General Education Requirements.

ISL 102 Islamic Studies I

Cr Hr: 2 Prerequisite: None

Introduces Islamic culture and stresses its importance and contribution to humanity. It presents Sharia Law in terms of sources, underpinnings, and objectives. It also enhances students' faith in the viability of Sharia Law and its all-inclusiveness. The course counts as a social science component of the university General Education Requirements.

ISL 112 Islamic Studies II

Cr Hr: 2 Prerequisite: ISL 101

Introduces the community and family systems in Islam, their underpinnings and reform mechanisms. It examines the problems these systems encounter and shatters misconceptions about them. It also presents the application of Sharia Law in pertinent contexts. The course counts as a social science component of the university General Education Requirements.

ISL 113 Islamic Studies II

Cr Hr: 2 Prerequisite: ISL 102

Islamic Medical Jurisprudence introduces the importance of learning medicine in Islam and presents

the Islamic legislative rulings related to various medical issues. It also includes the principles of jurisprudence and their legislative objectives. It offers contemporary medical issues and Islamic legislative stances. The course counts as a social science component of the university General Education Requirements.

ARB 101 Arabic Language I

Cr Hr: 2 Prerequisite: None

Concentrates on developing Arabic language skills in paragraph writing, orthography, punctuation, style, vocabulary, and conversation in Standard Arabic. It also enhances students' literary appreciation and provides morphological and syntactic insight into text analysis. This course counts as a humanities course in the university General Education Requirements.

ARB 101 IN Arabic language I Intermediate Level

Cr Hr: 2 Pre-requisites: None

Offered to students who have studied 4-6 years of Arabic at school or students who have not studied Arabic after the sixth grade. It focuses on dictation rules, basic grammar, literary appreciation, lexicon search, and paragraph writing.

ARB 101NN Arabic language I for Non-natives

Cr Hr: 2 Pre-requisites: None

Offered to students whose native language is not Arabic or students who have studied three years or less of Arabic at school. The course introduces the fundamental elements of the Arabic language within a cultural context. Emphasis is placed on the development of the basic language skills, vis., listening, speaking, reading, and writing, in addition to grammar and contextual vocabulary.

ARB 102 Arabic Language I

Cr Hr: 2 Prerequisite: None

Concentrates on developing Arabic language skills in paragraph writing, orthography, punctuation, style, vocabulary, and conversation in Standard Arabic. It also enhances students' literary appreciation and provides morphological and syntactic insight into text analysis. This course counts as a humanities course in the university General Education Requirements.

ARB 112 Arabic Language II

Cr Hr: 2 Prerequisite: ARB 101

Focuses on developing students' Arabic language skills to higher proficiency levels in various domains, including essay writing and conversation in Standard Arabic. The course also introduces the different literary schools and their characteristics. It counts as a humanities course in the university General Education Requirements.

ARB 112 IN Arabic language II Intermediate Level

Cr Hr: 2 Pre-requisites: ARB 101 IN

As a continuation of ARB 101 IN, ARB 112 IN focuses on Arabic syntax, semantics, report and essay writing, and literary appreciation and evaluation.

ARB 112NN Arabic language II for Non-natives

Cr Hr: 2 Pre-requisites: ARB 101 NN

Continues and builds upon the fundamental elements of Arabic within a cultural context. Continued emphasis on the development of basic language skills, vis., listening, speaking, reading and writing in addition to grammar and contextual vocabulary.

ARB 113 Arabic Language II

Cr Hr: 2 Prerequisite: ARB 102

Focuses on developing students' Arabic language skills to higher proficiency levels in various domains, including essay writing and conversation in Standard Arabic. The course also introduces the different literary schools and their characteristics. It counts as a humanities course in the university General Education Requirements.

ANT 101 Introduction to Sociocultural Anthropology

Cr Hr: 3 Prerequisite: None

The course explores anthropology and its four major sub-branches. It focuses on the significance of sociocultural anthropology for appreciating the diversity of contemporary and past human cultures and creating an awareness of ethnographic research methods and diverse anthropological perspectives. It enhances students' understanding of the similarities and differences among human cultures and their appreciation of cultural constructions of realities.

ANT 102 Entrepreneurial Multiculturalism

Cr Hr: 3 Prerequisite: None

Presents interdisciplinary knowledge on how business cultures evolve in various societies around the world. It also explores why some individuals/social groups are more successful in entrepreneurship than others within the same societies and cross-culturally.

FRE 101 French I

Cr Hr: 3 Prerequisite: None

It introduces the fundamental elements of the French language within a cultural context. Emphasis is placed on the development of the basic language skills, vis. listening, speaking, reading, and writing, in addition to grammar and vocabulary skills.

FRE 112 French II

Cr Hr: 3 Prerequisite: FRE 101

It builds upon the fundamental elements of the French language within a cultural context. Continued emphasis is placed on the development of basic language skills, vis. listening, speaking, reading and writing in addition to grammar and vocabulary skills.

GER 101 German I

Cr Hr: 3 Prerequisite: None

It introduces the fundamental elements of the German language within a cultural context. Emphasis is placed on the development of the basic language skills, vis. listening, speaking, reading, and writing, in addition to grammar and vocabulary skills.

GER103 German I for CoM Students

Cr Hr: 3 Prerequisite: None

The course introduces the fundamental elements of the German language within a medical context. Emphasis is placed on the development of the basic language skills such as listening, speaking, reading, and writing, in addition to grammar and vocabulary skills that aim to prepare for basic communication in a working environment at German clinics and hospitals.

GER 112 German II

Cr Hr: 3 Prerequisite: GER 101

It builds upon the fundamental elements of the German language within a cultural context. Continued emphasis is placed on the development of basic language skills, vis. listening, speaking, reading and writing in addition to grammar and vocabulary skills.

GER 113 – German II for CoM Students

Cr Hr: 3 Prerequisite: GER 103

The course builds upon the fundamental elements of the German language within a medical context. Continued emphasis is placed on the development of basic language skills such as listening, speaking, reading, and writing, in addition to grammar and vocabulary skills that aim to prepare for basic communication in a working environment at German clinics and hospitals

HIS 101 Islamic Civilization and Mediaeval Europe

Cr Hr: 3 Prerequisite: None

The course introduces the foundations of Islamic civilization, its development and prosperity, places of contact between Europeans and Muslims, and means of influence, such as direct contact and the translation of Islamic books in science, medicine, philosophy, literature and the arts.

PSY 101 Introduction to Psychology

Cr Hr: 3 Prerequisite: None

The course introduces psychology and its key concepts, theories, research methods, and contributions to the understanding of human behavior. Topics include the nervous system, perception, motivation, learning and memory, social behavior, personality, developmental, and clinical psychology. The course also introduces past and current theories and contributions of eminent psychologists.

SOC 101 Introduction to Sociology

Cr Hr: 3 Prerequisite: None

Introduces the basic concepts in the field, research methods, and theories. It addresses the interrelations among human societies, individuals, groups and organizations. Topics include social interaction, social institutions, social stratification, community, and social change strategies. This course elaborates on the social structure of Saudi Arabian society, its social institutions and stages of social transformation.

DEPARTMENT OF LIFE SCIENCE

Chair

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General Department Information:

The mission of the Department of Life Sciences is to promote understanding of the function of molecules, cells, tissues and organs with a concentration on hereditary factors and genetic mechanisms controlling fundamental biological processes, particularly in relation to the human body; and to contribute to the training of the next generation of research scientists, biotechnological entrepreneurs, educators, biomedical and allied health professionals.

The Department of Life Sciences envisions becoming a recognized national and international center of academic excellence by providing of high quality education in a broad spectrum of modern interdisciplinary life sciences to produce competent biomedical and biotech professionals responsive to the needs of the society.

Life Sciences Course Descriptions

BIO 101 General Biology I

Cr Hr: 3 +1 Lab Prerequisite: None

The course covers major fields and fundamental principles of modern biology and provides a foundation for more in-depth and specialized studies during the following years. The course concentrates on the core concepts of modern biology and provides knowledge about the role of various biological macromolecules in cell physiology; how different types of cells are integrated into multicellular systems; molecular and chromosomal mechanism of heredity.

BIO 103 Introduction to Human Biology

Cr Hr: 3 Prerequisite: None

The course concentrates on the basic aspects of human biology and provides knowledge about the role of various biological macromolecules in the human body, how different types of cells are integrated into multicellular systems, and how organs and organisms develop and function. The course satisfies the General Education Requirements in Science.

BIO 112 General Biology II

Cr Hr: 3 +1 Lab Prerequisite: BIO 101

This is the second module of the general biology introductory course designed for the Life Science Major curriculum. It concentrates on the fundamental aspects of animal physiology with an emphasis on the human body. The course is focused on the evolution, development, structure, function, health and disease of major physiological systems and regulatory mechanisms coordinating their function in the human organism.

BIO 223 Microbiology

Cr Hr: 3 +1 Lab Prerequisite: BIO 112, CHM112

The course provides a basic understanding of modern medical microbiology with emphasis on the contribution microorganisms make to human health and welfare and intensive study of the processes by which microorganisms cause human disease, how the pathogens can be recognized (identified) and what steps can be taken for the prevention and treatment of infections. The emphasis will be placed on the development of observational, practical and analytical skills through supervised laboratory work and demonstrations.

BIO 224 Human Physiology and Anatomy

Cr Hr: 3 +1 Lab Prerequisite: BIO 112

The course covers human anatomy and physiology from a systems-based perspective, stressing the ways in which different physiological systems interact. Emphasis is on understanding the integration of human anatomy through biological function, development, evolutionary history and genetics. Several clinical examples are given to illustrate how human variation, including congenital defects, emerges from the interaction of development, form, and function.

BIO 345 Molecular Biology I

Cr Hr: 3 +1 Lab Prerequisite: BIO223

As the first module of the Molecular Biology course, BIO 345 concentrates on molecular mechanisms of genetic processes. This module explains how the flow of biological information from DNA to RNA to protein gives rise to the recognizable, inherited attributes of living organisms. It uses seminal experiments to introduce the students to basic classical and molecular genetics, and then expands on these themes to include genetic engineering and genomic approaches to these phenomena.

BIO 357 Molecular Biology II

Cr Hr: 3 +1 Lab Prerequisite: BIO 345

As the second module of the Molecular Biology course, BIO 357 concentrates on molecular mechanisms of cellular physiology and interactions. This module provides detailed knowledge of the structural organization and differentiation of eukaryotic cells as well as key processes in development that are based on cell-cell communication and cell movement. It introduces fundamental properties of the cytoplasm and the roles of the cytoskeleton in fundamental biological processes, including chromosome separation, cell motility and intracellular transport processes, as well as the evolution, function and biogenesis of cell organelles.

BIO 346 Biochemistry I

Cr Hr: 3 +1 Lab Prerequisite: BIO 224, CHM 212, PHU 216, STA 211

The two-module Biochemistry course concentrates on the chemical properties of biological macromolecules with particular attention to the relationship between structure and biological function. The first module specifically covers amino acids, the fundamentals of protein structure, the basics of enzyme catalysis and kinetics, lipids, and membrane structures, transport proteins, the physicochemical basis of signal transduction, vitamins and their functional role in the body.

BIO 358 Biochemistry II

Cr Hr: 3 +1 Lab Prerequisite: BIO 346

The second module of the Biochemistry course concentrates on the complexity of metabolic pathways and their regulation. It reviews the inter-linked metabolic processes involved in nutrient handling and homeostasis.

BIO 325 Conservation Biology

Cr Hr: 3 Prerequisite: BIO 223

This course is general in nature that provides a general introduction to conservation biology. Conservation Biology is the scientific study of the phenomena that affect the maintenance, loss, and restoration of biological diversity. Topics covered include: 1) the impacts of global warming, species invasions, and habitat destruction on biodiversity, 2) strategies developed to combat these threats, and 3) a consideration of key economic and ethical tradeoffs. Special attention will be paid to current debate and controversy within this rapidly emerging field of study.

ENV 305 Environmental Health

Cr Hr: 3 Prerequisite: BIO 223

The course examines the physical, biological and chemical factors affecting human health. The course also explores approaches to control the major environmental health problems in industrialized and developing countries. A range of topics are covered including how the body reacts to environmental pollutants; physical, chemical, and biological agents of environmental contamination; vectors for dissemination (air, water, soil); solid and hazardous waste; susceptible populations; the scientific basis for policy decisions; and emerging global environmental health problems.

SCI 321 Immunology

Cr Hr: 3 Prerequisite: BIO 224

SCI 321 aims to provide students with an understanding of immunology and the immunological basis of some common and well-known diseases. The course will balance basic knowledge of the underlying complexity of the immune system, such as T and B cell receptor genes, the MHC and antigen presentation, with the application of immunological aspects to infectious diseases, cancer, inflammation and autoimmunity.

SCI 322 Cancer Biology

Cr Hr: 3 Prerequisite: BIO 224

This course will introduce the core aspects of cancer biology. Emphasis will be placed on molecular mechanisms of cancer pathophysiology - such as signal transduction, DNA damage and repair and regulation of cell division, death and senescence as well as on system biology, microevolution of tumors, interaction between tumor and organism. Existing and novel strategies of cancer prevention, diagnosis and treatment will be discussed.

SCI 323 Signal Transduction

Cr Hr: 3 Prerequisite: BIO 224

The concept of "signal transduction pathway" is one of the major advancement in our understanding of how living cell – a unit of life – is functioning: how it adapts to changing environment and communicates with neighbours in multicellular organisms. The perspective of "signal transduction" is essential to understand complex biological processes and diseases ranging from memory formation to diabetes and cancer. The course makes sense of the dizzying array of pathways used by the cell to communicate.

BIO 405 Human Genetics

Cr Hr: 3 Prerequisite: BIO345

BIO 405 will cover: 1) the genetic and molecular basis of heredity and inherited traits, 2) how genetics and genomics help to understand the human condition, including genetic diseases, cancer, and human evolution, 3) how basic and translational genetics research is leading to improvements to human health, and 4) current ethical discussions related to human genetics.

SCI 325 Bioinformatics and Computational Genomics

Cr Hr: 3 Prerequisite: BIO112, STA211

The course is a combination of lectures and instructor-guided practical sessions. SCI325 will cover: 1) the theoretical basis of various comparative analyses of DNA and protein sequences, 2) how bioinformatics, genetics and genomics help to understand the population and evolutionary processes, 3) how computational genomic analyses generate testable hypotheses, and 4) a role of bioinformatics in conservation biology, current human genetics and medicine.

LST 421 Life Science Special Topics I

Cr Hr: 3 Prerequisite: BIO 346

LST courses introduces special topics relevant to Biomedical Science. The course subjects can be modified according to faculty availability, students' preferences and pathways.

LST 421 Epigenetics

The course will first review recent progress in understanding fundamental epigenetic mechanisms and events controlling normal human development and physiology, such as growth, metabolism and ageing processes together with environmental factors affecting the human epigenome. This will follow with reviews of the recent discovering of epigenetic etiology of some most significant human disorders.

BIO 440 Biotechnology

Cr Hr: 3 Prerequisite: BIO 223, ENV 205

The aim of this course is to provide a basic understanding of modern biotechnology and its applications. This course is focused on the molecular and genetic tools used to analyze and modify organisms to produce desired

small molecules and proteins; discuss established and cutting-edge manipulation techniques in the field of synthetic biology. We will also cover the production of biofuels, bioplastics, amino acids, food additives, various bulk chemicals, and biopharmaceuticals.

LSR 302 Research Methodology

Cr Hr: 3 Prerequisite: ENG112

The course aims to provide students with the basic concepts of research, types of research and the research method. The ultimate aim of this course is to equip students with skills on how to formulate a research hypothesis, review literature, design research projects, acquire & analyze data and report the research findings. The students will also be introduced to research writing and ethical issues associated with research.

LSR 421~422 Life Science Research Project I&II

Cr Hr: 6 Prerequisite: LSR 302

The courses represent a two-semester-term individually guided investigation project involving laboratory work and/or computational investigation in some aspect of Biomedical Science. The background, results and conclusions of the study to be reported in the form of an oral presentation and progress report by the end of Fall semester, and a thesis and final defense at the end of the course.

LSR 423 Integrative Life Science Research Seminar

Cr Hr: 3 Prerequisite: LSR 421

LSR423 course is designed to train students to summarize results obtained during student research project courses, built up scientific hypotheses and discuss their merits in group seminars with an assessment of the subsequent self-directed learning in oral presentations, coursework or undergraduate thesis writing and defence. This course develops transferable skills associated with analysis and presentation of laboratory-based experimental research in Life Sciences in the form of poster and podium presentation.

SCI 326 Virology

Cr Hr: 3 Prerequisite: BIO 223

The course focuses on the principles of virus structure, replication and genetics. It will help the students appreciate the relevance of virology in the modern world, including the fields of vaccines, anti-viral drugs and cancer. Other acellular biological particles like prions are also discussed. The course reflects many recent developments in virology and offers deeper insights into the subject. Newly-discovered and emerging viruses are discussed.

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCES

Chair

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General Department Information:

Mathematics are critical to understanding scientific and engineering concepts. Nature laws are described in a mathematical language, and engineering concepts are modeled and achieved through mathematical tools. The Department of Mathematics & Computer Science is endeavoring to become a world-class leader in mathematics and computer science by designing advanced programs and a vibrant environment for developing graduates with the solid academic and technical backgrounds. To achieve this challenging objective, the department is offering world-class education for our students and maintain high quality research programs. The department offers a wide selection of courses that allow students to acquire a solid base in mathematics and computer science. Our teaching is aimed at developing the students' analytical skills and critical thinking capacities, and to give the students the opportunity to discover the intellectual depth of mathematics & computer science, and their relations to other disciplines.

Mathematics and computer science play an ever-increasing role in many emerging fields of study, most notably in Engineering, Life Science and Physical Sciences. As the Kingdom moves towards knowledge-based industries, applied mathematics and computer science are considered strategic fields of national importance. As a support for the emergence and the rapid growth of the cited fields, the department offers a wide range of courses for Engineering, Life science, Medicine and Business programs.

Mathematics & Computer Science Course Descriptions

CSC 101 Introduction to Computer Science

Cr Hr: 3 Prerequisite: None

This course provides an introduction to a disciplined approach to computer programming and problem solving, utilizing a block-structured high-level language, with an emphasis on procedural abstraction and good programming style. Students will apply programming skills in solving a variety of problems. Algorithmic concepts are also introduced. This course also provides a survey study of data structures and data abstraction, and an introduction to complexity considerations and program verification.

MAT 100 Pre-calculus

Cr Hr: 3 Prerequisite: None

This course builds sound and strong basic mathematics that are required for studying undergraduate mathematics. This course is particularly important to students whose mathematical skills are not sufficiently developed at the high school level. The course covers materials that include algebraic operations, radical and rational expression, equalities and in-equalities, functions and analytic geometry, special types of functions (linear, quadratic, inverse, polynomial, rational, exponential, logarithmic and trigonometric), solution to equations, and identities involving some types of functions.

MAT 101 Calculus I

Cr Hr: 3 Prerequisite: None

This course introduces the basic concepts of mathematical analysis used in science and engineering. The course teaches an introduction to differential and integral calculus. Topics include limits; the derivative; rates; Newton's method; the mean-value theorem; max-min problems; the integral and the fundamental theorem of integral calculus; areas, volumes, and average values.

MAT 105 Calculus for Biomedical Sciences I

Cr Hr: 3 Prerequisite: None

This course offers a solid introduction to differential and integral calculus and is designed for students in the biomedical sciences. The course begins with an intensive review of important topics from pre-calculus and an introduction to discrete time and population models. Then it proceeds to cover limits, continuity, differentiation, derivative rules, curve sketching, optimization, difference equations, anti-derivatives, Riemann sums, definite integral, fundamental theorem of calculus, applications of integration.

MAT 111 Business Calculus

Cr Hr: 3 Prerequisite: MAT 100

The main objective of this course is to help the student in understanding the basic concepts of calculus on the one hand, and to develop the skills needed for using calculus as a viable tool to solve problems that arise in the study of business and economics. Topic covered include, limits, types of functions (polynomial, rational, exponential and logarithmic), their derivatives, anti-derivatives and their various applications.

MAT 112 Calculus II

Cr Hr: 3 Prerequisite: MAT 101

This course is a continuation to Calculus I. The course covers basic mathematical analysis and mathematical tools that are widely used and are essential for mathematical analysis and applications. Topics include sequences; infinite series; power series; conics; polar, cylindrical, and spherical coordinates; vectors and the geometry of space; and vector valued functions.

MAT 116 Calculus for Biomedical Science II

Cr Hr: 3 Prerequisite: MAT 105

This course is a continuation of MAT 105. The course covers further integration techniques, such as integration by parts, by substitution and by partial fractions. Other topics include improper integrals, sequences and series, convergence tests, power and Taylor series, solving differential equations, limits and continuity of functions of two variables, partial derivatives, the double integral.

MAT 211 Calculus III

Cr Hr: 3 Prerequisite: MAT 112

This course deals with multi-dimensional calculus. It is designed primarily for engineering majors and is taken by other technical majors. The student will develop an understanding of limits and continuity of functions of several variables; compute partial derivatives and apply to optimization problems; set up and compute iterated integrals to compute areas, volumes of solids; understand and apply Green's Theorem, the Divergence Theorem and Stoke's Theorem.

MAT 212 Linear Algebra

Cr Hr: 3 Prerequisite: MAT 112

The course teaches an introduction to linear algebra. Topics include complex numbers, geometric vectors in two and three dimensions and their linear transformations, the algebra of matrices, determinants, and solutions of systems of equations, vector space, eigenvalues and eigenvectors.

MAT 213 Differential Equations

Cr Hr: 3 Prerequisite: MAT 112

This course is an introduction to the theory and application of ordinary differential equations and the Laplace transform. The main objective is for the student to develop competency in the basic concepts and master certain solution methods. Topics covered include linear and nonlinear first order equations; higher order linear differential equations; undetermined coefficients method; variation of parameters method; Cauchy-Euler equation; Laplace transform; linear systems solution; solution by series method.

MAT 224 Numerical Methods

Cr Hr: 3 Prerequisite: MAT 212, MAT 213

This course introduces the basic concepts of numerical analysis that are employed in science and engineering. It includes a solid introduction to the basic methods and approximation techniques in use, and to the reliability and accuracy of the approximations. Applications of the methods to simplified/model problems that represent real-life problems are also included. Programming skills (based on MATLAB/OCTAVE) needed to implement the methods on a computer are also covered.

STA 211 Probability and Statistics

Cr Hr: 3 Prerequisite: MAT 116

STA 211 introduces the basics of probability and statistics as used in sciences. It covers introduction to probability, random variables, some common probability distributions, random vectors, sample statistics, regression, and applications in experimental sciences.

STA 212 Probability and Statistics for Engineers

Cr Hr: 3 Prerequisite: MAT 112

The course is designed to teach students the basics of probability and statistics as used in engineering and the sciences. The course covers introduction to probability theory, random variables, statistics, and regression.

DEPARTMENT OF PHYSICS

Chair

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General Department Information:

As a part of the College of Science and General Studies (COSGS) at Alfaisal University, the Department of Physics seeks to become a nationally and internationally recognized model in training of the next generation of Highly Qualified Personnel (HQP) in strategic sectors of a high relevance to the Kingdom of Saudi Arabia and worldwide, such as Energy (Alternative Energies), Nanotechnology and Health (Medical physics). This can be achieved by offering world-class education and training of students in Applied Physics. Capitalizing on high-caliber faculty, this objective will be strongly supported by cutting-edge research activities exploiting the exceptional local infrastructure. The ultimate goal is to serve the Kingdom of Saudi Arabia through contributing to the development of knowledge-based economy.

Physics is also valuable in different areas of biology, engineering, business and medicine. As such, the Physics Department of Alfaisal University is currently offering physics courses for life sciences, engineering, business and preparatory year medicine-pathway students.

Physics Course Descriptions

PHU 101 Astronomy

Cr Hr: 3 Prerequisite: None

This elective course is designed for College of Business students to fulfil part of their science requirements. The material of the course is presented in a survey manner using only pre-calculus mathematics. The covered material includes spectroscopy, telescopes, the solar system and its formation theories, the life cycle of stars, galaxies and the general structure of the universe, and an introduction to cosmology.

PHU 102 Science of Energy and the Environment

Cr Hr: 3 Prerequisite: None

This elective course is designed for College of Business students to fulfil part of their science requirements. The material of the course is presented in an interactive manner with the students with minimum use of mathematics. The course material covers topics ranging from basic energy concepts to fossil fuels, including oil and gas, renewable and nuclear energy sources and usage. The course also covers the environmental issues as they pertain to the Kingdom of Saudi Arabia, the Gulf region and globally.

PHU 103 Mechanics and Waves for Engineers

Cr Hr: 3 Co-requisite: MAT 101 (if not completed previously)

The material of this course requires knowledge of differential and integral calculus. The covered material is based on Newtonian Mechanics and includes the study of 1-, 2- and 3- Dimensional translational Motion and Rotation Motion kinematics and Dynamics, energy, power, momentum, impulse, Gravitation, periodic motion and mechanical waves.

PHU 103 L Mechanics and Waves for Engineers Labs

Cr Hr: 1 Co-requisite: PHU 103 (if not completed previously)

This material constitutes the laboratory related to the course PHU 103.

PHU 124 Electromagnetism and Waves for Engineers

Cr Hr: 3 Prerequisite: PHU 103 & MAT 101

The material of this course requires knowledge of differential and integral calculus. The covered material includes the basics of electricity and magnetism, electromagnetic radiation, and optics.

PHU 124 L Electromagnetism and Waves for Engineers Labs

Cr Hr: 1 Co-requisite: PHU 124 (if not completed previously)

This material constitutes the laboratory related to the course PHU 124.

PHU 205 Mechanics for Life Sciences

Cr Hr: 3 Prerequisite: None

This course is the first of a two-semester sequence that introduces the basic concepts of algebra-based physics. It deals in essence with classical mechanics. The topics covered include particle kinematics and dynamics; conservation of energy and linear momentum; rotational kinematics and angular momentum; simple harmonic motion and fluids.

PHU 205 L Mechanics for Life Sciences

Cr Hr: 1 Co-requisite: PHU 205 (if not completed previously)

This constitutes the laboratory related to the course PHU 205.

PHU 216 Electromagnetism and Optics for Life Sciences

Cr Hr: 3 Prerequisite: PHU 205

The material of the course is Algebra based. The covered material includes the basics of electricity and magnetism, electromagnetic radiation, and optics.

PHU 216 L Electromagnetism and Optics for Life Sciences Labs

Cr Hr: 1 Co-requisite: PHU 216 (if not completed previously)

This material constitutes the laboratory related to the course PHU 216.