

**CHEM 3480 Advanced Materials (3,3,0)**

Prerequisite: Year III standing

This course is to expose students to the study of current and important topics in the selected area of materials chemistry, and to enable students to gain an overview of recent research development of those selected areas.

**CHEM 3550 Integrated Chemistry Laboratory (1,0,3)**

Prerequisite: Year III standing with CHEM 1112 Organic Chemistry II and CHEM 2310 Physical Chemistry II and/or Advanced Level Chemistry

This course aims to introduce students to application of chemistry principles from Year II and Year III chemistry courses. Industrial chemical analysis, material processing, and separation processes are treated with illustrations chosen from modern industry.

**CHEM 3560 Bioanalytical Chemistry (3,3,0)**

Prerequisite: CHEM 2170 Instrumental Analysis or CHEM 2510 Chemical Analysis

This course is aimed at students in chemistry, biology and biomedical sciences who are interested in learning the basic principles and instrumental techniques in the analysis of biomolecules, such as proteins and nucleic acids. Topics covered include sample preparation and separation techniques, molecular recognition techniques, nucleic acids amplification and sequencing, protein sequencing and analysis, and applications of mass spectrometry in bioanalysis.

**CHEM 3591-2 Final Year Project I & II (3,0,9)**

Co-requisite: Year III standing

An individual project which is usually of interdisciplinary or applied courses in the final year, and requires knowledge and skill acquired in the course. A thesis and an oral presentation are required upon completion of the project. This course is open to Chemistry majors only.

**CHEM 3610 Dissertation in Chemistry (3,\*,\*)**

Prerequisite: Year III standing

This course provides opportunities for students to be engaged in literature research (i.e. non-laboratory based) in a particular topic in pure or applied chemistry. The students are expected to work, as individuals or in small groups, closely with a member of the teaching staff. The outcome of this research work will be presented orally as well as in the form of a written dissertation for grading at the end of the study period.

**CHEM 3910 Special Topics in Chemistry (3,3,0)**

Prerequisite: Chemistry major with Year II standing or consent of instructor

This course is devoted to the study of up-to-date and important topics in different areas of chemistry. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. This course will also take care of those topics that have not been specifically included in programme.

**CHEM 4006 Environmental Chemistry and Pollution Control (3,3,0)**

Prerequisite: CHEM 1005 Introduction to Chemistry or CHEM 1015 Foundation of Chemistry

This course describes the sources, transport, reactivity and sink of contaminants in the environment together with various technology options used for pollution control. The interconnection between air, water, land pollution and human activities will be addressed.

**CHEM 4007 Environmental Studies Laboratory (1,0,3)**

Prerequisite: CHEM 1005 Introduction to Chemistry and Year III or above standing

This course aim to give students practical experience in the following areas: (1) quantitative determinations of selected environmental pollutants, (2) monitoring of their ecological impacts, and (3) some treatment methods for their removals. Problems of local concern will be emphasized.

**CHEM 4015 Integrated Chemistry Laboratory (1,0,3)**

Prerequisite: Final year Chemistry students with CHEM 2009 Organic Chemistry II and CHEM 3007 Physical Chemistry II

This course aims to introduce students to the application of chemical principles acquired from final and previous year chemistry related major courses. Chemical manufacturing, material processing, separation process, environmental and food-related topics are treated with illustrations chosen from modern chemical technology.

**CHEM 4016 Dissertation In Chemistry (3,\*,\*)**

Prerequisite: Chemistry major Year IV standing

This course aims to train students to (1) conduct detailed and extensive literature search on current topics in pure and applied chemistry, and (2) organize and present the relevant information gathered from such search in a dissertation format.

**CHEM 4017 Environmental Analysis (3,3,0)**

Prerequisite: CHEM 3005 Instrumental Analysis or CHEM 3025 Chemical Analysis

This course aims to train students with knowledge of various pollution monitoring techniques, and cause and effect relationships so that they will be able to select the appropriate procedure in the solution of environmental problems.

**CHEM 4025 Advanced Instrumental Analysis (3,3,0)**

Prerequisite: CHEM 3005 Instrumental Analysis or CHEM 3025 Chemical Analysis

Basic principles, methodologies, and instrumentation concerning major analytical techniques, such as mass spectrometry, gas and liquid chromatography, electrochemistry, and atomic spectroscopy will be covered. Emphasis will be placed on the application of these analytical techniques to solving real-world problems, based on case studies borrowed from commercial and government laboratories. Such practical knowledge will be helpful to students in pursuing a career in analytical science.

**CHEM 4026 Advanced Materials (3,3,0)**

Prerequisite: Year III or above standing

This course aims to expose students to the study of current and important topics in the selected area of materials chemistry, and to enable students to gain an overview of recent research development in these selected areas.

**CHEM 4027 Bioanalytical Chemistry (3,3,0)**

Prerequisite: CHEM 3005 Instrumental Analysis or CHEM 3025 Chemical Analysis

To introduce students to the basic principles and techniques in the analysis of biomolecules.

**CHEM 4035 Bioorganic and Natural Products Chemistry (3,3,0)**

Prerequisite: BIOL 2005 Biological Chemistry or CHEM 2009 Organic Chemistry II or CHEM 2036 Fundamentals of Organic Chemistry

This course deals with the biosynthesis of several important classes of natural products including polyketides, terpenoids, steroids and alkaloids. The interaction of some natural and synthetic molecules with living systems and the relevance of natural products to the well being of humankind are to be discussed.

**CHEM 4036 Fundamentals and Applications of Chemical Processes (3,3,0)**

Prerequisite: CHEM 3007 Physical Chemistry II, CHEM 2046 Physical and Inorganic Chemistry or consent from instructor

This course aims to introduce students to the fundamentals of modern chemical industries. Students will learn materials and energy balance, basic kinetics and reactors design, examples in separation technology, and economic consideration of modern chemical industries. Students will come to understand some

of the major issues involved in modern industrial chemistry via analysis of their processes.

**CHEM 4037 Materials Science: Solid State, Surface Chemistry and Catalysis (3,3,0)**

Prerequisite: Chemistry or Physics majors with Year IV standing  
This course provides a foundation of solid state and surface chemistry. It deals with the modern surface techniques and the application of surface science to various important industrial fields with particular reference to surface catalysis. The objective is to provide students with exposure to solid state and surface chemistry as well as to familiarize them with some techniques for material characterization and surface analysis.

**CHEM 4045 Organic Synthesis (3,3,0)**

Prerequisite: CHEM 2008 Organic Chemistry I and CHEM 2009 Organic Chemistry II; or with consent of instructor  
This course gives an outline on the basic concepts and methodologies of building up an organic molecule. Topics covered include carbon-carbon bonds formation, functional groups transformations and total synthesis of several selected molecules of widely differing types of structure. Recent development on asymmetric synthesis will be addressed.

**CHEM 4046 Organometallic Chemistry (3,3,0)**

Prerequisite: CHEM 3015 Inorganic Chemistry  
The objective of this course is to provide a concise introduction to organometallic chemistry. Upon completion of the course, the students will have a fundamental understanding of (1) reaction mechanism, (2) synthesis and reactivity, and (3) industrial applications of organometallic complexes.

**CHEM 4047 Pharmaceutical Chemistry (3,3,0)**

Prerequisite: BIOL 2005 Biological Chemistry; or CHEM 2008-9 Organic Chemistry I & II; or CHEM 2036 Fundamentals of Organic Chemistry  
To provide a systematic study of various mechanisms of drug action and how effective therapeutic agents are developed.

**CHEM 4055 Polymer Chemistry (3,3,0)**

Prerequisite: CHEM 2009 Organic Chemistry II and CHEM 3007 Physical Chemistry II; or CHEM 2036 Fundamentals of Organic Chemistry and CHEM 2046 Physical and Inorganic Chemistry; or with consent of instructor  
This course aims to introduce students to the fundamental principles of polymer materials science. Students will learn the meanings of synthetic polymers, their synthesis, their properties, and their applications to modern technology. Students will come to understand all the current issues involved how polymers are made, characterized and applied.

**CHEM 4056 Special Topics in Chemistry (3,3,0)**

Prerequisite: Chemistry majors with Year III standing or above or consent of instructor  
This course is devoted to the study of those current and important topics in chemistry that are not covered in the core and elective courses within the programme curriculum.

**CHEM 4057 Spectroscopic Techniques for Structure Determination (3,3,0)**

Prerequisite: CHEM 2009 Organic Chemistry II and CHEM 3007 Physical Chemistry II; or CHEM 2036 Fundamentals of Organic Chemistry and CHEM 2046 Physical and Inorganic Chemistry; or CHEM 3025 Chemical Analysis  
To enable students to understand the basic principles of some modern spectroscopic techniques commonly used in chemical structure determination. To apply the spectroscopic techniques learnt in the determination of unknown molecular structures.

**CHEM 4065 Structural Methods in Chemistry (3,3,0)**

Prerequisite: CHEM 2009 Organic Chemistry II and CHEM 3007 Physical Chemistry II; or CHEM 2036 Fundamentals of Organic Chemistry and CHEM 2046 Physical and Inorganic Chemistry  
To equip students with a working knowledge of the major structural techniques in chemistry.

**CHEM 4066 Dissertation in Environmental Studies (3,\*,\*)**

Prerequisite: Chemistry majors (Year IV standing) in Environmental Studies Concentration  
This course trains students to (1) conduct detailed and extensive literature search on current topics in environmental science, and (2) organize and present the relevant information gathered from such search in a dissertation format.

**CHEM 4067 Atmospheric Science (3,3,0)**

Prerequisite: CHEM 2017 Physical Chemistry I or CHEM 2046 Physical and Inorganic Chemistry or consent of the instructor  
This course describes the fundamentals of photochemistry, kinetics, and mechanisms to the most important homogeneous and heterogeneous processes that take place in our natural and polluted atmosphere. Their critical interactions on local, regional and global scales will be addressed as well.

**CHEM 4075 Marine Chemistry (3,3,0)**

Prerequisite: Any Science majors with Year III standing  
This course describes the nature and the chemical process in the marine environment. It aims to provide an in-depth understanding of the interrelationship of chemistry and other marine science disciplines and our daily life. Major ion composition of seawater, inputs to and outputs from the ocean via rivers, the atmosphere and the sea floor, biogeochemical cycles within the oceanic water column and sediments, recent discoveries and development in marine chemistry will be briefly discussed.

**CHEM 4076 Chemical Testing Laboratory Management and Accreditation (4,\*,\*)**

Prerequisite: CHEM 3005 Instrumental Analysis or CHEM 3025 Chemical Analysis  
The course intends to introduce students the concept of quality management system in chemical and testing laboratories. In particular, concept of ISO 9001 and ISO/IEC 17025 will be emphasized. Through laboratory practice, students will also acquire adequate technical skills in the maintenance and calibration of analytical equipment and instruments.

**CHEM 4077 Dissertation in Analytical and Testing Sciences (3,\*,\*)**

Prerequisite: Analytical and Testing Sciences majors Year IV standing  
To train students to conduct detailed and extensive literature search on current topics in pure and applied chemistry. To train students to organize and present the relevant information gathered from such search in a dissertation format.

**CHEM 4085 Food Analysis (3,3,0)**

Prerequisite: CHEM 3005 Instrumental Analysis or CHEM 3025 Chemical Analysis  
This course addresses the basic principles, procedures, instrumentations, and applications of food analysis. Emphasis will be placed on the chemical, physical, and microbial analysis of the major components and harmful substances in foods.

**CHEM 4086 Forensic Analytical Chemistry (3,3,0)**

Prerequisite: BIOL 2005 Biological Chemistry or CHEM 2008-9 Organic Chemistry I & II, or CHEM 2036 Fundamentals of Organic Chemistry  
To provide students the advanced analytical methods in forensic chemistry for their applications to the analysis of controlled substances and materials with an emphasis on new method development.