

NB: BIOL 423 is an appropriate addition to or substitution for BIOL 409, 410.

Prerequisite(s): CHEM 221, 222; a minimum grade of C in BIOL 223, and at least one of BIOL 384 or 372. BIO 371 is highly recommended. (0-4; 0-0)

BIOL 438 Virology (3 sem. hrs.)

The course provides a basic understanding of some of the current topics in modern virology including the structure, classification, and replication of viruses, virus-cell interactions, diagnostic and research applications in virology, and the molecular biology of several important viruses causing disease in humans and animals. Special emphasis is given to viral pathogenesis making this course suitable for those pursuing careers in medicine or related fields.

NB: Not offered every semester. See Department chair.

Prerequisite(s): BIOL 223; 333; and BIOL 372 or 386. (0-0; 3-0)

BIOL 450 Neuroscience (3 sem. hrs.)

An advanced course in neuroscience which examines current research on the cellular organization of the brain as well as the role of physiological processes in human thought, emotions, and behaviour. Interactions between physiological and psychological processes are emphasized. Laboratory experiments focus on the basics of recording bioelectric potentials in invertebrates and humans.

Prerequisite(s): BIOL 350 or PSYC 350. (0-0; 3-3)

BIOL 470 Genomics, Proteomics, Bioinformatics (3 sem. hrs.)

An overview of the interdisciplinary science of genomics, proteomics, and bioinformatics which applies the tools of information technology (computer hardware and software) to analyze biological data such as gene or protein sequences. This course examines the theory of bioinformatics as well as its practical application to biological problems using approaches such as BLAST searches, phylogenetics, and protein structure function analysis.

Prerequisite(s): BIOL 223; BIOL/CHEM 372, and either 3 sem. hrs. of Computing Science or MATH 102. (0-0; 3-3-0)

BIOL 474 Genetics and Cell Biology of Neoplasia (3 sem. hrs.)

A lecture course reviewing a wide range of topics related to cancer including the biology and immunology of tumor cells, chemical and viral carcinogenesis, oncogenes, genetic predisposition to cancer, and treatment strategies.

NB: Not offered every year. See Department chair.

Prerequisite(s): BIOL 223, and one of BIOL 340, 372, or 386. (0-0; 3-0)

BIOL 482 Applied Ecology (3 sem. hrs.)

An exploration of various practical applications of biology in environmental management, monitoring, and remediation. Topics include many important areas of concern such as wildlife management, fisheries, forestry, agriculture, water and air pollution, and protection of endangered ecosystems. Various biological approaches to these are considered, such as population modelling, ecophysiology, microbiology techniques, biomonitoring, ecosystem health, and biodiversity inventories. The implications of environmental ethics and the role of Christian environmental stewardship are discussed.

NB: Not offered every year. See Department chair.

Prerequisite(s): BIOL 381 (may be taken concurrently). (0-0; 3-3)

For further course listings, see Au Sable Institute of Environmental Studies listings (under Environmental Studies).

BIOTECHNOLOGY

BIOT 100 Biotechnology Practicum I (1 sem. hr.)

This hands-on course is an intern program in the Biology Department at TWU providing instruction in general laboratory procedures and laboratory safety beyond that provided during regular undergraduate laboratories. The tasks include general care of laboratory animals and plants, microbial culture, preparation of microbial culture media, and preparation of chemical and biochemical reagents.

Prerequisite(s): BIOL 103 or BIOL 113. (0-0, 0-1)

BIOT 200/300/400 Biotechnology Practica II, III, IV (2 or 3 sem. hrs.)

Biotechnology Practica II–IV provide general and advanced intern experiences in industrial settings. BIOT 200 (2 sem. hrs.) is a requirement for entry to co-op placements and graduation. BIOT 300 and 400 (3 sem. hrs. each) are additional intern experiences providing exposure to advanced techniques and applications in biotechnology. The skills taught in each practicum vary depending on the industrial setting but should include some of the following techniques: mammalian tissue culture; monoclonal antibody production including cell fusion; hybridoma screening by ELISA and immunoblotting; fermentation microbiology and the operation of large-scale fermentation systems; insect cell culture and use of Baculovirus expression vectors to produce recombinant proteins; downstream processing and the recovery and purification of proteins, carbohydrates, lipids; freezing, freeze-drying and preservation of microorganisms, animal viruses, cell lines and hybridomas; high throughput screening strategies, diagnostic testing; methods in bioinformatics; and quality control procedures.

Prerequisite(s): BIOT 100.

BIOT 290 Introduction to Biotechnology (3 sem. hrs.)

This course reviews the role of modern biotechnology in plant, animal, and marine biology, microbiology, agriculture, the pharmaceutical industry and medicine. The course focuses on underlying technologies in biotechnology, how these technologies are implemented, together with public concerns and government guidelines and legislation.

Prerequisite(s): BIOL 103, 104, and 105 or BIOL 113, 114. (3-0 or 3-0)

BIOT 390 Biotechnology and Christian Theology (3 sem. hrs.)

This course is designed to untangle some of the actual or perceived dissonance between issues of biological science and Christian theology. Six major topics are addressed: (1) models, analogies and metaphors in science and Christian theology; (2) Scientific and religious investigations of the biosphere; (3) defining human nature; (4) defining non-human nature; (5) caring for the earth; and (6) the biomedical revolution. The common threads among these topics are the tension between Christian faith and the findings of basic and applied biology (biotechnology), and the call to action required in a faith-based view of creation. As well as speaking from their own disciplines and background, the course instructors will take part in panel discussions at the end of each of the six units to foster discussion and dialogue on the issues. Student participation will be further encouraged by group projects in which the group must develop and present a position paper on an area that engenders dissonance between scientific and religious worldview perspectives.

Cross-listed: BIOL 390.

Prerequisite(s): BIOL 103, 104, and 105 or BIOL 113, 114; third year standing. (3-0 or 3-0)

BIOT 409 Thesis Preparation (1 sem. hr.)

Students choose a research topic for their senior thesis in consultation with biotechnology faculty. Selected readings and pertinent references to the topic are assigned. A final

written report is presented consisting of a detailed thesis proposal with a review of the literature.

Prerequisite(s): Advanced standing in biotechnology. (1-1; 0-0)

BIOT 410 Senior Thesis (2 sem. hrs.)

Research in a chosen area of biotechnology with a final written report and oral presentation of research finds. Prerequisite(s): BIOL 409, a related directed study in preparation, or instructor's consent. (0-0; 1-2)

BIOT 470 Genomics, Proteomics, Bioinformatics (3 sem. hrs.)

An overview of the interdisciplinary science of genomics, proteomics, and bioinformatics which applies the tools of information technology (computer hardware and software) to analyze biological data such as gene or protein sequences. This course examines the theory of bioinformatics as well as its practical application to biological problems using approaches such as BLAST searches, phylogenetics, and protein structure function analysis.

Cross-listed: BIOL 470.

Prerequisite(s): BIOL 223; BIOL/CHEM 372; and either 3 sem. hrs. of Computing Science or MATH 102. (0-0; 3-3-0)

BIOT 490 Advanced Biotechnology (3 sem. hrs.)

This capstone course in biotechnology considers the theoretical and practical aspects of implementing biotechnology, paying particular attention to current issues including: 1) technology transfer and commercialization; 2) patent protection in biotechnology; 3) Good Laboratory Practices (GLP); 4) Good Manufacturing Practices (Food and Drug Regulations, 2002 edition); 5) Good Clinical Practices (GCP); 6) Research Ethics Board guidelines; 7) validation studies; 8) downstream processing and the recovery of purified products; 9) novel developments in methodology. The course includes a seminar series by industry and regulatory experts and site visits to local biotechnology companies to assess how they have implemented and overcome obstacles to production and quality control.

Prerequisite(s): BIOT 290. (0-0; 3-3)

BUSINESS

BUSI 110 Business in the Global Market (3 sem. hrs.)

An introduction to global business practices. A survey of governmental and corporate practices of major economic systems — Japan, Europe, Pacific Rim, Rhine countries, etc. Different cultural meanings of concepts such as globalization, world class, nimble organizations, empowerment, and teams are explored. The class provides the students with experiential as well as classroom learning to provide a better grasp of the differences in cultures and the adaptation of business concepts.

NB: Offered when available in summer with overseas travel component.

Cross-listed: ECON 110.

Prerequisite(s): Instructor's consent.

NB: Open to Business and non-Business majors.

BUSI 111 Introduction to Business and Management (3 sem. hrs.)

Modern business is studied in its various aspects: economic and social setting, business classifications and financial requirements, business structure and functional areas, basic concepts and techniques, practices and responsibilities, and career opportunities in business.

Prerequisite(s): None. (3-0; 3-0)

BUSI 221 Principles of Accounting I (3 sem. hrs.)

Accounting fundamentals, techniques, principles and concepts. Other topics include the complete accounting cycle, including adjusting and closing entries, the

preparation and interpretation of simple financial statements, inventory treatments, capital assets, and partnership accounting. Students are also required to complete a computer based accounting lab.

Prerequisite(s): None. (3-0; 3-0)

BUSI 222 Principles of Accounting II (3 sem. hrs.)

The first half of the course focuses on financial accounting with topics such as shareholder equity, investments, the cash flow statement, the comprehensive income statement and financial analysis. Students learn to analyze and extract key information from corporate financial statements. The second half of the course focuses on managerial accounting covering topics such as cost-volume-profit analysis and budgeting.

Prerequisite(s): BUSI 221 (3-0; 3-0)

BUSI 241 Personal Financial Planning (3 sem. hrs.)

Personal financial planning is key to the successful accomplishment of our life goals. Topics covered in this course include: foundations in financial planning, asset management, debt management, insurance analysis, investment management, retirement planning, and estate planning.

NB: Open to Business and non-Business students.

Prerequisite(s): None. (3-0; 0-0)

BUSI 275 Business Statistics (3 sem. hrs.)

Statistical tools and knowledge necessary for success in business endeavours. Descriptive statistics, probability (with discrete and continuous distributions), hypothesis testing, regression, and ANOVA. Students learn theory behind the methods, and primarily use spreadsheets as tools for solving advanced problems.

Cross-listed: ECON 275.

Prerequisite(s): MATH 120 or 101; or instructor's consent. (3-0; 3-0)

BUSI 276 Quantitative Analysis (3 sem. hrs.)

Mathematical modeling principles, concepts, and algorithms used in business problem formulation and solution interpretation. Linear, non-linear, and goal programming, project management, decision theory, simulation, queuing, forecasting, and inventory control models. The relationship to modern information systems is also discussed.

Cross-listed: ECON 276.

Prerequisite(s): BUSI/ECON 275, and familiarity with spreadsheet software. (3-0; 3-0)

BUSI 280 Organizational Behaviour (3 sem. hrs.)

Focuses on the nature of individuals and behaviour in organizations. The emphasis of the course is on building a set of conceptual and pragmatic skills useful in understanding and managing interactions among individuals and groups within organizations. By providing a knowledge base of organizational and managerial concepts, and by using cases, videos, exercises and personal inventories, this course develops a student's analytical, diagnostic, and interpersonal skills.

Prerequisite(s): BUSI 111 and second year standing or instructor's consent. (3-0; 3-0)

BUSI 301 Managerial Economics (3 sem. hrs.)

The study of the main principles and techniques of price theory and its practical applications. Major topics covered include price, production and distribution theories, the theory of the firm, risk and uncertainty, game theory, and transaction costs. New developments and/or approaches to microeconomic analysis.

Cross-listed: ECON 301.

Prerequisite(s): ECON 201, 202; MATH 120. (3-0; 0-0)

BUSI 302 Intermediate Macroeconomics for Managerial Decision-Making (3 sem. hrs.)

The main concepts and methods usually used by economists to explain macroeconomic variables: inflation, unemployment, consumption, investment, foreign trade,