

## **New Option: B.Sc (Honours) and Management**

### **1. INTRODUCTION**

The Faculty of Science and the Faculty of Business and Information Technology already offer joint programs in Science and Management. At the present time, a student can choose to do a Bachelor of Science and Management (Honours) in Biological Science and Management which includes all the specialization and co-op education or a Bachelor of Science and Management (Honours) in Physical Science and Management. The Bachelor of Science in Physical Science has been created for students who wish for more freedom in the choice of their courses and so increase the breadth of their education. Now, most students in Science choose to focus on a particular discipline (biological science, physics, etc), but for students not in Biological Science and not wishing to go into the Physical Science program, the option of doing the + Management option was not available. We propose to remedy this situation and give non-biological science students the same options by creating Bachelor of Science + Management options for students in the following programs:

Applied and Industrial Mathematics (including co-op education)  
Chemistry (including all specializations and co-op education)  
Computing Science (including all specializations and co-op education)  
Forensic Science (including all specializations)  
Physics (including all specializations and co-op education)

One should note that the initial submission for Science and Management programs in 2004 included Chemistry, Physics, Energy and the Environment as well as Radiation Science + Management streams. However, due to financial constraints that the university had under the PEQAB structure at the time, the Provost decided to go ahead only with the Biological and Physical Science programs with Management. Therefore, this proposal also seeks to complete a process by which all Science disciplines will have a + Management option, as was initially intended.

The structure of these new programs will be similar to the existing Biological Science and Management as well as Physical Science and Management. However, note that we are introducing a change in the admission requirements for existing programs which will apply also for the proposed programs.

There is a wealth of opportunities for graduates in the sciences in industry, government, and in fields of applied science, and the combination of a science degree and business and management education will give an added advantage to graduates of these programs to establish careers in practical areas.

### **2. DEGREE REQUIREMENTS**

#### **a. Program learning outcomes**

The Science and Management Program has been designed to provide students with a strong foundation in science and the ability to apply this knowledge to the world of business. The programs of study in UOIT's BSc programs have been planned to provide students with a thorough understanding of fundamental scientific principles, confidence in the use of mathematics and computer technology, and in-depth knowledge of at least one specialized area of scientific study. In the first year of each Science program, students will be exposed to core concepts in mathematics, physics, chemistry and biology.

They will then proceed to take more specialized and advanced courses in a designated area of science. This will contribute to their conceptual understanding of a comprehensive body of knowledge needed for employment or graduate study in their chosen field. Students will gain an awareness of inter-relationships among subjects and disciplines and acquire the practical skills necessary for the study and application of science. Graduates of the science programs will be well qualified to work in interdisciplinary areas in science-based employment settings or to contribute to research in specific areas of their discipline.

### **Depth and Breadth of Knowledge**

In addition to key concepts and a strong foundation of current theory, research and practice in their related science disciplines, graduates of the Science and Management degree program will acquire a general management perspective and a sound base of knowledge related to key areas of business and management. Graduates will be familiar with the diverse and complex roles managers assume in the operation of successful organizations. They will have an understanding of social, political, economic, technological and international issues that affect managerial decision-making. They will exhibit a solid understanding of core principles of financial and managerial accounting theory and competence in the use of accounting data to critically evaluate business options. They will demonstrate coherent knowledge of: effective marketing practices and terminology; practices which facilitate the effective management and development of an organization's human resources; systems for the planning, controlling and improvement of operations for the production and delivery of goods and services; the role, utilization and impact of information technologies in organizations; and sound guidelines for financial decision-making aimed at generating positive returns for stakeholders.

All courses have been designed to help students develop an understanding of theory, current research and practice. As students engage in the study of the fundamental science and mathematics courses, courses in their core science discipline and in business, and additional liberal studies electives, they will gain an awareness of inter-relationships among subjects and disciplines and acquire a range of practical skills necessary for the study and application of knowledge.

Exposure to the distinctive assumptions and modes of analysis of disciplines other than science and business will be provided in a number of carefully chosen breadth courses that are interspersed throughout the first four years of the program. These courses will emphasize oral, written and interpersonal communication skills, promote a broader understanding of the needs of society, and contribute to the development of citizens with well-rounded educations. They will expose students to social, political, economic, cultural and ethical dimensions that will inform their decisions in the workplace. Such courses will strengthen students' abilities to function as responsible and informed citizens and lend multiple perspectives to their decision-making in personal and professional roles.

### **Knowledge of Methodologies**

Problem solving, critical analysis, and synthesis are cognitive skills essential to success in any discipline. Students are called upon to utilize these skills beginning in the first semester and to hone them throughout the remainder of the program. A variety of learning opportunities will contribute to this growth. These include: case studies, problem based learning activities, collaborative and independent work, laboratory experiments, simulation exercises and role play, written critiques of theory and research, structured debates, and oral and written presentations that require justification of theses and decisions.

Students will be actively engaged in these intellectual processes as they work with actual challenges faced by individuals in the worlds of science and business. Realistic and practical assignments will develop and strengthen students' abilities to critically analyze the information they see, hear and read, to identify assumptions and implicit values, to gather appropriate data to inform and guide decision-making, to create and assess a range of solutions, to predict risks and to evaluate outcomes. In teams, students will be exposed to a variety of perspectives and called upon to listen, assess and incorporate the ideas of others into the problem solving process. Collaborative activities will enable them to pose questions, devise and sustain arguments, and to be active participants in the learning process. While engaged in such interactive processes, they will learn from and contribute to the learning of others.

The emphasis on the integration of technology into delivery methods, learning activities, assignments, and presentations will ensure that students in the Science and Management Program develop a degree of comfort and competence in the use of technology to acquire, manage and use information to support their learning and to integrate into professional practice.

Students will learn how to use contemporary laboratory procedures and equipment safely and efficiently. All courses with laboratory components will incorporate the study and practice of safety and quality concepts. Students will be required to exercise sound professional judgement and personal responsibility in laboratory activities for the duration of the program and in their future professional roles.

Most of the core and elective courses in science require students to use the techniques of analysis and enquiry in order to complete assignments, conduct research and participate in activities and projects. Students will be called upon to use such tools and techniques with greater frequency and efficiency as they complete multifaceted assignments and analyse progressively complex scientific problems and case studies. The investigation, critical analysis and application of current research will be part of many course requirements, including the culminating *Thesis Project* in the fourth year of each Honours science program.

Independent and group assignments will require students to engage in the analysis of primary and secondary sources of data, to comment upon current aspects of research in the discipline and to explore their application to professional practice in both scientific and business contexts.

### **Application of Knowledge**

Upon graduation, students will be called upon to assume a range of roles in a variety of different work environments, independently and as members of teams. Throughout the program, theoretical knowledge and understanding will be enhanced and extended as students engage in extensive and varied classroom and laboratory learning activities. The business courses in the final year will use case-based learning activities to expose students to real-world business challenges and scenarios. This will provide them with opportunities to analyze and devise a range of solutions to address realistic problems. Cases will be carefully selected so that students are required to demonstrate both an understanding of relevant scientific issues and an ability to apply business and management concepts to decisions in scientific contexts.

**Communication:**

As part of the learning activities in science, business and elective courses, students will learn and use the key language, terminology and communication styles needed to dialogue with expert and other stakeholders. Formal and informal presentations, along with written assignments and technical reports, will further develop students' abilities to communicate information, ideas, problems and solutions to specialist and non-specialist audiences. Throughout the program, students will be called upon to demonstrate thoughtful, purposeful communication, using a range of media common to both scientific and business environments. They will participate in learning activities and assignments to practice and refine their basic oral and written communication styles, including essay and report writing, role play, structured debates, cooperative learning activities and oral presentations. They will acquire the skills necessary to adapt the content and format of their communication to meet the needs of the specified audience.

**Awareness of Limits of Knowledge**

Realistic case studies and projects and presentations by representatives from science, industry and business will expose students to the complexities and challenges of dynamic disciplines. Graduates will work in highly complex and often unpredictable situations, across different types of organizations, with a wide variety of colleagues and clients. Change and ambiguity are normal features of such environments and students will develop positive attitudes and pro-active strategies to manage them. Students will come to recognize that a strong base of knowledge, an ability to locate and utilize resources efficiently, and a willingness to take informed risks will serve them well in demanding situations and environments. Students will be knowledgeable about and make use of the main sources of scholarly information in both the science and business disciplines, including professional publications, conferences, well-designed web-sites and professional organizations. They will also be sensitive to the limits of their knowledge and skills and recognize that their professional competence will continue to grow with ongoing mentoring, continuing education and practical experience.

**Autonomy and Professional Capacity**

All courses have been designed to emphasize the development of transferable skills which contribute to the students' effectiveness as independent learners, team members and managers and leaders. Throughout the entire program, students are involved in a variety of tasks that involve the demonstration of effective communication skills using oral, written, graphic and electronic formats. All UOIT programs place a strong emphasis on technological competence, providing students with the tools to gather and manage information and to use it effectively and ethically in research, assignment preparation and presentations to peers and professionals. The coursework in the program involves many group activities and assignments. Students will be required to plan as part of a team, to fulfill the responsibilities assigned to them and to assume the role of team player or leader as appropriate. They will encounter individuals whose backgrounds, goals and opinions differ from their own, and they will be required to manage those differences in respectful, diplomatic ways. Those differences will enhance their abilities to critically analyze new information for accuracy, to present their own ideas in clear and non-threatening ways and to learn to be open to new perspectives and opportunities for learning. Students cannot help but benefit from these opportunities to practice and refine their skills in active listening, critical analysis, negotiating and problem solving. Their ability to collaborate and cooperate within this context will be of great value as they join new teams in subsequent courses and projects. The

demanding workload will require them to organize their time and manage their projects efficiently in order to meet clearly defined standards of performance and expected deadlines.

#### **b. Admission requirements**

Applications to the Bachelor of Science and Management will be accepted in the winter semester of student's 3<sup>rd</sup> year of study. A minimum GPA of 2.3 is required to be eligible to apply to the program. This program may have limited space and applications are considered on a competitive basis. Successful applicants will be notified by the Registrar's Office by the end of May term of application.

#### **c. Program structure**

The Calendar copy and program maps are available below. Note that the program maps of the Science discipline are not provided as they are identical to the ones in the Calendar.

#### **d. Program content**

There are no new courses developed.

### **3. RESOURCE REQUIREMENTS**

No extra resources are requested as the Science and Management programs are being run using the existing resources in both the Faculty of Science and the Faculty of Business and Information Technology.

### **4. BUSINESS PLAN**

No additional funds are needed to support these programs and the Deans of Science and Business and Information Technology support those new programs.

### **Calendar copy and program maps – changes from the previous map are highlighted**

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#### 14.12 Science and Management programs

##### 14.12.1 General information

UOIT's Bachelor of Science and Management (Honours) is available to students in the Applied and Industrial Mathematics program (including co-op education), the Physical Science program and any specialization including co-op education within the following programs: Biological Science, Chemistry, Computing Science, Forensic Science, and Physics. The combination Science and Management program will consist of the curriculum from the selected science program and 10 courses in business and management that are taken in Year 5 of the regular program or Year 6 of the co-op program. Graduates will benefit from a complete science education complemented by solid accounting, finance, operations, human resources and marketing skills.

#### 14.12.2 Admission requirements

Applications to the Bachelor of Science and Management will be accepted in the winter semester of student's 3<sup>rd</sup> year of study. A minimum GPA of 2.3 is required to be eligible to apply to the program. This program may have limited space and applications are considered on a competitive basis. Successful applicants will be notified by the Registrar's Office by the end of May term of application.

#### 14.12.3 Careers

There is a wealth of opportunities for graduates in the sciences in industry, government, and in fields of applied science, and the combination of a science degree and business and management education will give an added advantage to graduates of these programs to establish careers in practical areas.

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### SECTION 14: FACULTY OF SCIENCE

#### 14.12.4 Program overview and degree requirements

The Science and Management program follows the same program map as the four-year degree program for each option. The program includes the addition of 10 BUSI courses in fifth or sixth year. Please note the Business electives are subject to availability of space and not all electives are offered each semester.

Bachelor of Science and Management (Honours) in Biological Science and Management including

Co-operative Education

- Complementary Studies
- Environmental Toxicology specialization
- Life Sciences specialization
- Pharmaceutical Biotechnology specialization

Bachelor of Science and Management (Honours) in

Physical Science and Management

Applied and Industrial Mathematics and Management , including

- Co-operative Education

Physics and Management, including

- Comprehensive
- Astrophysics Specialization
- Energy and Environmental Physics specialization
- Co-operative Education

#### Chemistry and Management, including

- Comprehensive
- Biological Chemistry specialization
- Pharmaceutical Chemistry specialization
- Co-operating Education

#### Computing Science and Management, including

- Comprehensive
- Digital Media specialization
- Co-operative Education

#### Forensic Science and Management

- Biology specialization
- Chemistry specialization
- Physics specialization
- Psychology specialization

### YEAR 5

#### Semester 1 (15 credit hours)

BUSI1101U Financial Accounting  
 BUSI2050U Managerial Economics  
 BUSI2311U Organizational Behaviour  
 BUSI 2550U Introduction to Project Management

One additional Business elective selected from:

BUSI1700U Introduction to Entrepreneurship  
 BUSI2930U Leadership, Negotiation and Teamwork  
 BUSI3330U The Management of Change  
 BUSI3560U Innovation Management  
 BUSI3040U Information Systems

#### Semester 2 (15 credit hours)

BUSI2170U Managerial Accounting  
 BUSI2410U Managerial Finance  
 BUSI 2603U Operations Management

BUSI2205U Principles of Marketing

One of:

BUSI3700U Strategic Management for Professionals

BUSI3710U Small Business Management

Notes:

- Students graduating from the Science and Management programs will be allowed to apply up to a maximum of 48 credit hours (16 courses) at the first-year level towards their degree, 6 credit hours of which must be counted towards the "and management" course requirements, including BUSI 1101U.