Information Technology

Program Requirements

Course Categories

- Carleton University Electives
- Algonquin college Electives

Please check the current lists of approved electives on the program web site.

Information Resource Management
B.I.T. (20.0 credits)

A. Credits Included in the Major CGPA (12.0)

1. 4.0 credits in:		4.0
IRM 1000 [0.5]	Introduction to Libraries and Information Society	
IRM 1001 [0.5]	Metadata and Cataloguing I	
IRM 1002 [0.5]	Reference I	
IRM 1003 [0.5]	Collections management	
IRM 1004 [0.5]	Reader's Advisory Services	
IRM 1005 [0.5]	Web Interface Development	
IRM 1006 [0.5]	Subject Analysis and Indexing	
BIT 1400 [0.5]	Introduction to Programming and Problem Solving	

2. 3.0 credits in:		3.0
IRM 2000 [0.5]	Multimedia Data Management	
IRM 2001 [0.5]	Metadata and Cataloguing II	
IRM 2002 [0.5]	Reference II	
IRM 2003 [0.5]	Classification	
IRM 2004 [0.5]	Information Management and Digital Preservation	
BIT 2400 [0.5]	Intermediate Programming	

3. 2.5 credits in:		2.5
IRM 3000 [0.5]	Metadata and Cataloguing III	
IRM 3001 [0.5]	Reference III	
IRM 3002 [0.5]	Research Methodology	
IRM 3003 [0.5]	Legal Issues in Information Resource Management	
IRM 3004 [0.5]	Project management	

4. 2.5 credits in:		2.5
IRM 4000 [0.5]	Library Software	
IRM 4001 [0.5]	Archives and Special Collections	
IRM 4002 [0.5]	Network Technology	
IRM 4900 [1.0]	Final IRM Project	

B. Credits Not Included in the Major (8.0 credits)

5. 3.0 credits in:		3.0
BIT 2000 [0.5]	Introduction to Statistics	
BIT 2001 [0.5]	Introduction to Business	
BIT 2002 [0.5]	Marketing in the IT sector	
CCDP 3006 [0.5]	Communication Skills for IRM	
IRM 3005 [0.5]	Directed Reading for IRM	
IRM 4003 [0.5]	Practicum for IRM	

6. 1.0 credit in French Language (see Note 2, below)	1.0
7. 4.0 credits in electives to be fulfilled by courses taken to complete a Minor (see Note 1, below)	4.0

Total Credits	20.0

Notes:

1. **Additional requirements**: students must complete a Minor in another academic discipline.
2. **Language requirement:** all students are expected to improve their current French language skill by one credit. Should a student be assessed as fluently bilingual; 1.0 credit of alternate language courses will be accepted. Canadian Aboriginal languages would be encouraged in such cases.

Interactive Multimedia and Design
B.I.T. (20.0 credits)

A. Credits Included in the Major CGPA (13.5 credits)

1. 3.0 credits in:		3.0
BIT 1400 [0.5]	Introduction to Programming and Problem Solving	
IMD 1000 [0.5]	Introduction to Interactive Multimedia Design	
IMD 1001 [0.5]	Visual Communication	
IMD 1002 [0.5]	Visual Dynamics	
IMD 1004 [0.5]	Design Processes	
IMD 1005 [0.5]	Web Development	

2. 3.0 credits in:		3.0
BIT 2400 [0.5]	Intermediate Programming	
IMD 2000 [0.5]	Multimedia Data Management	
IMD 2003 [0.5]	Audio and Video	
IMD 2005 [0.5]	Motion Graphics	
IMD 2900 [1.0]	Design Studio 1	

3. 4.0 credits in:		4.0
IMD 3001 [0.5]	Aspects of Product Design Methodology	
IMD 3002 [0.5]	3D Computer Graphics	
IMD 3004 [0.5]	Human Computer Interaction and Design	
IMD 3005 [0.5]	Sensor-Based Interaction	
IMD 3900 [1.0]	Design Studio 2	
IMD 3901 [1.0]	Design Studio 3	

4. 3.5 credits in:		3.5
IMD 4003 [0.5]	3D Computer Animation	
IMD 4005 [0.5]	Advanced Topics in Multimedia	
IMD 4901 [1.5]	Senior IMD Project	
IMD 4902 [1.0]	Design Studio 4	

B. Credits Not Included in the Major CGPA (6.5 credits)

5. 1.5 credit in:		1.5
BIT 1002 [0.5]	Physics for Information Technology I	
BIT 1100 [0.5]	Mathematics I for IMD	
BIT 1101 [0.5]	Mathematics II for IMD	

6. 2.0 credits in:		2.0
BIT 2000 [0.5]	Introduction to Statistics	
BIT 2001 [0.5]	Introduction to Business	
BIT 2002 [0.5]	Marketing in the IT sector	
BIT 2006 [0.5]	Elective	

7. 0.5 credit in:		0.5
IMD 3003 [0.5]	Communication Skills for IMD	

8. 0.5 credit in:		0.5
IMD 4002 [0.5]	Technology and Culture	

9. 1.0 credit in Arts and Social Sciences electives for IMD	1.0

10. 1.0 credit in electives for IMD, and/or Directed Studies		1.0
BIT 4000 [0.5]	Directed Studies	
Total Credits		20.0

Retention of Work (Interactive Multimedia and Design Program Only)

A portfolio represents a record of the student's progress and design experience over the years, and is an indispensable requirement for any future job application. A portfolio is started in first year and continues to expand until graduation. The School, therefore, requires that each student produce reductions (normally 8 1/2 x 11 inch reproductions, colour or black and white, slides, and/or digital format CD) of his or her work at the end of each term. One copy of the work should be put in the student's portfolio and the other turned in to the instructor for retention in the School's archives. (This facilitates retrospective exhibitions of work, accreditation, publications and any future references for pedagogic purposes.) Original work is the property of the students, but the School retains the right to keep work of merit for up to four years after the date of submission. The School will make every effort to preserve the work in good condition, and will give authorship credit and take care of its proper use.

Network Technology
B.I.T. (20.0 credits)

A. Credits Included in the Major CGPA (9.0 credits)

1. 2.5 credits in:		2.5
BIT 1000 [0.5]	Mathematics I for NET	
BIT 1002 [0.5]	Physics for Information Technology I	
BIT 1400 [0.5]	Introduction to Programming and Problem Solving	
NET 1002 [0.5]	Networking Fundamentals	
NET 1006 [0.5]	Routing and Switching	
2. 1.5 credits in:		1.5
BIT 2400 [0.5]	Intermediate Programming	
NET 2000 [0.5]	Intermediate Networking	
NET 2001 [0.5]	Wide Area Networking	
3. 2.5 credits in:		2.5
NET 3000 [0.5]	Database Concepts and SQL	
NET 3001 [0.5]	Real-time Systems	
NET 3008 [0.5]	Advanced Network Routing	
NET 3010 [0.5]	Web Programming	
NET 3900 [0.5]	Wireless Networks	
4. 2.5 credits in:		2.5
NET 4005 [0.5]	Networked Applications	
NET 4007 [0.5]	Multimedia Networking	
NET 4010 [0.5]	Secure Mobile Networking	
NET 4901 [1.0]	Network Technology Project	

B. Credits Not Included in the Major CGPA (11.0 credits)

5. 2.5 credits in:		2.5
BIT 1001 [0.5]	Mathematics II for NET	
BIT 1003 [0.5]	Physics for Information Technology II	
BIT 1006 [0.5]	Elective	

NET 1001 [0.5]	Computer Technology Basics	
NET 1004 [0.5]	Assembly and Machine Language	
6. 3.5 credits in:		3.5
BIT 2000 [0.5]	Introduction to Statistics	
BIT 2001 [0.5]	Introduction to Business	
BIT 2002 [0.5]	Marketing in the IT sector	
NET 2002 [0.5]	Desktop & Server Environments	
NET 2003 [0.5]	Linux Networking	
NET 2004 [0.5]	Communication Skills for NET	
NET 2007 [0.5]	Basics of Transmission Systems	
7. 2.5 credits in:		2.5
NET 3004 [0.5]	Data Structures	
NET 3006 [0.5]	Network Management and Measurements	
NET 3007 [0.5]	Network Security	
NET 3011 [0.5]	Advanced Network Switching	
NET 3012 [0.5]	IP Architectures and Solutions	
8. 2.0 credits in:		2.0
NET 4000 [0.5]	Emerging Network Technologies	
NET 4001 [0.5]	Network Simulation	
NET 4003 [0.5]	Computer Systems Architecture	
NET 4009 [0.5]	Troubleshooting IP Networks	
9. 0.5 credit in Arts and Humanities electives for NET.		0.5
Total Credits		20.0

Photonics and Laser Technology
B.I.T. (20.0 credits)

A. Credits Included in the Major CGPA (10.0 credits)

1. 3.5 credits in:		3.5
BIT 1203 [0.5]	Physics for Photonics I	
BIT 1400 [0.5]	Introduction to Programming and Problem Solving	
PLT 1002 [0.5]	Trends in Photonics	
PLT 1003 [0.5]	Optics/Optical Fibers I (Principles)	
PLT 1005 [0.5]	Introduction to Optics	
PLT 1006 [0.5]	Introduction to Automation and Simulation	
PLT 1007 [0.5]	Assembly and Machine Language	
2. 2.0 credits in:		2.0
BIT 2007 [0.5]	Mathematics III for PLT	
PLT 2003 [0.5]	Laser Systems	
PLT 2005 [0.5]	Circuits and Signals	
PLT 2006 [0.5]	Semiconductors	
3. 2.0 credits in:		2.0
PLT 3003 [0.5]	Electro Magnetics	
PLT 3004 [0.5]	Design of Optical Components and Systems	
PLT 3009 [0.5]	Project Management	
PLT 3010 [0.5]	Data Structures	
4. 2.5 credits in:		2.5
PLT 4001 [0.5]	Optoelectronic Devices	
PLT 4006 [0.5]	Image and Signal Processing	
PLT 4900 [1.0]	Photonics Research Project	
PLT 4007 [0.5]	Introduction to Solid State Physics	

B. Credits Not Included in the Major CGPA (10.0 credits)

5. 1.5 credits in:		1.5
BIT 1200 [0.5]	Mathematics I for PLT	

BIT 1201 [0.5]	Mathematics II for PLT	
BIT 1204 [0.5]	Physics for Photonics II	
6. 4.5 credits in:		4.5
BIT 2000 [0.5]	Introduction to Statistics	
BIT 2001 [0.5]	Introduction to Business	
BIT 2002 [0.5]	Marketing in the IT sector	
BIT 2004 [0.5]	Differential Equations For Photonics	
BIT 2005 [0.5]	Multivariate Calculus for Photonics	
BIT 2400 [0.5]	Intermediate Programming	
PLT 2001 [0.5]	Fundamentals of Light Sources	
PLT 2002 [0.5]	Fiber Optics Communications I	
PLT 2008 [0.5]	Manufacturing Photonics Components	
7. 2.0 credits in:		2.0
PLT 3000 [0.5]	Fiber Optics Communications II	
PLT 3001 [0.5]	Photonics Manufacturing Systems	
PLT 3002 [0.5]	Real-time Systems	
PLT 3008 [0.5]	Communication Skills for PLT	
8. 1.0 credit in:		1.0
PLT 4000 [0.5]	Applications of Quantum Physics	
PLT 4004 [0.5]	Biomedical Photonics	
9. 0.5 credit in Arts and Humanities electives for PLT.		0.5
10. 0.5 credit in Free Electives		0.5
Total Credits		20.0

Information Resource Management (IRM) Courses

IRM 1000 [0.5 credit]
Introduction to Libraries and Information Society
Overview of the role of libraries and related issues in the information society. Course will examine the organization, services and programs provided by different types of libraries. Issues such as access to information, information management, literacy, censorship will also be discussed.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week.

IRM 1001 [0.5 credit]
Metadata and Cataloguing I
Introduction to the descriptive cataloguing of monographs including International Standard Bibliographic Description (ISBD), the Anglo-American Cataloguing Rules, 2nd edition (AACR2), and Machine Readable Cataloguing (MARC21). Focus is placed on original cataloguing using these standards.
Prerequisite(s): Restricted to students in the B.I.T. program.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 1002 [0.5 credit]
Reference I
Introduction to the theory and techniques needed to conduct reference interviews and interpret reference queries. Students learn to select and use general reference sources such as dictionaries, encyclopedias, directories, bibliographies, periodical indexes, almanacs, and handbooks in print, and electronic formats.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 1003 [0.5 credit]
Collections management
Introduction to the principals of collections management including techniques and procedures for selecting, ordering and receiving library materials, accounting, collection development and automated acquisitions. Students also learn policies and procedures required for circulation, document delivery and interlibrary loans.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 1004 [0.5 credit]
Reader's Advisory Services
Students become familiar with fiction and non-fiction materials available to various categories of clients and learn how to market them. In addition, students further develop through various assignments their researching, writing, speaking, listening and communication skills.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week.

IRM 1005 [0.5 credit]
Web Interface Development
Combining graphics, text, audio and video to develop websites on an individual basis and in groups, using latest versions of HyperText Markup Language(HTML), Cascading Style Sheets (CSS), JavaScript and data interchange formats such as Extensible Markup Language(XML) and JavaScript Object Notation(JSON).
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

IRM 1006 [0.5 credit]
Subject Analysis and Indexing
Students learn the basic theory of subject analysis and indexing methods used to provide access to library materials and literature. Practical instruction makes use of thesauri, as well as standard subject heading lists, such as Sears and Library of Congress.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures two hours a week, tutorial/laboratory two hour a week.

IRM 2000 [0.5 credit]
Multimedia Data Management
Concepts and fundamentals of relational database systems. Students learn how to design relational databases starting from a conceptual data model, following accepted logical and physical design principles. Topics include normalisation, referential integrity, SQL, DDL and SQL DML & ODBC and data extraction/filtering techniques.
Precludes additional credit for IMD 2000.
Prerequisite(s): IRM 1005 and BIT 1400.
Lectures three hours a week, tutorial/laboratory three hours a week.

IRM 2001 [0.5 credit]
Metadata and Cataloguing II
Introduction to recent changes in the description of bibliographic material including Functional Requirements for Bibliographic Records (FRBR), Functional Requirements for Authority Data (FRAD), Functional Requirements for Subject Authority Data (FRSAD) and the recently published new cataloguing rules, Resource Description and Access (RDA).
Prerequisite(s): IRM 1001.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 2002 [0.5 credit]
Reference II
Students develop skills in planning and executing information searches and evaluating print and electronic resources. Students learn to locate information on selected topics, compile subject-specific annotated bibliographies and instruct library clients in the use of specialized materials and databases.
Prerequisite(s): IRM 1002.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 2003 [0.5 credit]
Classification
How to interpret and apply Dewey Decimal and Library of Congress Classification systems. Also includes analysis of the subject content of materials, building notation, using tables, shelf-listing techniques and creating unique book numbers.
Prerequisite(s): IRM 1006.
Lectures two hours a week, tutorial/laboratory one hour a week.

IRM 2004 [0.5 credit]
Information Management and Digital Preservation
Essentials of information management in an organization including the life cycle management of files in paper and the electronic environment. This course will also cover contemporary issues in information management and digital preservation.
Prerequisite(s): IRM 1000.
Lectures two hours a week, tutorial/laboratory one hour a week.

IRM 3000 [0.5 credit]
Metadata and Cataloguing III
Students already familiar with AACR2 and RDA are introduced to another approach to descriptive cataloguing using a metadata format. The course is based on the Dublin Core Metadata Initiative and focuses upon the cataloguing of web-based material.
Prerequisite(s): IRM 2001.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 3001 [0.5 credit]
Reference III
Students enhance their knowledge of print and electronic reference sources in science and technology. Students learn to compile specialized subject-specific bibliographies and assignments provide training in the use of science and technology reference sources.
Prerequisite(s): IRM 2002.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 3002 [0.5 credit]
Research Methodology
Introduction to the logic and design of research. Qualitative and quantitative research methodology with emphasis on the application and interpretation of statistical techniques for data analysis.
Prerequisite(s): BIT 2000.
Lectures three hours a week.

IRM 3003 [0.5 credit]
Legal Issues in Information Resource Management
In-depth analysis and assessment of copyright and other forms of intellectual property. Legal issues related to information technology. Topics may include privacy, surveillance and monitoring, access to information, freedom of expression, Charter and human rights issues, and security.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week.

IRM 3004 [0.5 credit]
Project management
Identification, selection, initiation, and organization of projects. Risk assessment, budget issues, communication, project scheduling, performance monitoring and control. Emphasis on practical techniques related to the field of information management using case studies.
Prerequisite(s): third year standing in the Information resource management program.
Lectures two hours a week, tutorial/laboratory two hours a week.

IRM 3005 [0.5 credit]
Directed Reading for IRM
A course of independent study under the supervision of a faculty member in the Library.
Prerequisite(s): IRM 3002. Only open to students in the IRM program.
Lectures three hours a week.

IRM 4000 [0.5 credit]
Library Software
Using skills and knowledge of automated systems already developed in introductory courses, students learn the theory and receive the hands-on practice needed to use library databases. A component on choosing and comparing library software is included.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures two hours a week, tutorial/laboratory one hour a week.

IRM 4001 [0.5 credit]
Archives and Special Collections
Principles and methods used by archivists and record managers in organizing their collections for better access and retrieval. Students also learn aspects of physical bibliography, the book trade, preservation and conservation of books and how to exhibit such material.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week.

IRM 4002 [0.5 credit]
Network Technology
Foundation knowledge for computer networks and communications. Topics include basic network design, layered communications models, IP addressing and subnets, and industry standards for networking media and protocols, with an emphasis on TCP/IP protocol suite and Ethernet environments.
Prerequisite(s): BIT 2400.
Lectures two hours a week, tutorial/laboratory one hour a week.

IRM 4003 [0.5 credit]
Practicum for IRM
Students will design and complete a project related to information management under the supervision of faculty / staff at the Library. This course provides the opportunity to apply knowledge gained in previous courses. Graded Sat/ Uns.
Prerequisite(s): fourth year standing in the Information Resource Management program.
Tutorial/laboratory eight hours a week.

IRM 4900 [1.0 credit]
Final IRM Project
Student-initiated project developed in association with a project supervisor and external information resource management advisor. Project is supported by a written report, seminar discussions and final presentation. All proposals must be approved by the IRM Program Project Committee.
Prerequisite(s): IRM 3004 and fourth year standing in the IRM program.
Tutorial hours arranged.

Information Technology (BIT) Courses

BIT 1000 [0.5 credit]
Mathematics I for NET
Tailored for students in the Network Technology program, this course covers basic concepts in functions (polynomials, exponential, logarithmic) and introduces concepts of limits, derivatives and rules of differentiation, applications of differentiation (max-min problems, curve sketching) and integration.
Precludes additional credit for BIT 1100, BIT 1200, ECON 1401, ECON 1402, MATH 1002, MATH 1004, MATH 1007, MATH 1009, MATH 1401, MATH 1402.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

BIT 1001 [0.5 credit]
Mathematics II for NET
Tailored for students in the Network Technology program, this course covers systems of linear equations, vector space of n-tuples, subspaces and bases, matrix transformations, kernel, range, matrix algebra and determinants, inner products and orthogonality, eigenvalues, diagonalization and applications.
Precludes additional credit for BIT 1101, BIT 1201, ECON 1401, ECON 1402, MATH 1104, MATH 1107, MATH 1119, MATH 1401, MATH 1402.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial and laboratory one hour a week.

BIT 1002 [0.5 credit]
Physics for Information Technology I
An introductory course on energy, thermodynamics, sound and electromagnetic waves, optics, and modern physics. Practical skills are learned in the laboratory, which is a required part of the course.
Precludes additional credit for BIT 1203, PHYS 1001, PHYS 1003, PHYS 1007.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial three hours/ laboratory three hours alternate weeks.

BIT 1003 [0.5 credit]
Physics for Information Technology II
Electrostatics, electric field and potential. Capacitors, inductors. Study of DC and AC Circuits. Introduction to semiconductors. Practical skills are learned in the laboratory, which is a required part of the course.
Precludes additional credit for BIT 1204, PHYS 1002, PHYS 1004, PHYS 1008.
Prerequisite(s): BIT 1002.
Lectures three hours a week, tutorial three hours/ laboratory three hours alternate weeks.

BIT 1006 [0.5 credit]
Elective
Students must choose from among a list of approved Electives at Algonquin College.
Precludes additional credit for BIT 2003 (no longer offered).
Prerequisite(s): restricted to students in the B.I.T. degree program.

BIT 1100 [0.5 credit]
Mathematics I for IMD
Tailored for students in the Interactive Multimedia Design program, this course covers basic concepts in functions (polynomials, exponential, logarithmic) and introduces concepts of limits, derivatives and rules of differentiation, applications of differentiation (max-min problems, curve sketching) and integration.
Precludes additional credit for BIT 1000, BIT 1200, ECON 1401, ECON 1402, MATH 1002, MATH 1004, MATH 1007, MATH 1009, MATH 1401, MATH 1402.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

BIT 1101 [0.5 credit]
Mathematics II for IMD
Tailored for students in the interactive Multi-media Design program, this course covers systems of linear equations, vector space of n-tuples, subspaces and bases, matrix transformations, kernel, range, matrix algebra and determinants, inner products and orthogonality, eigenvalues, diagonalization and applications.
Precludes additional credit for BIT 1001, BIT 1201, ECON 1401, ECON 1402, MATH 1104, MATH 1107, MATH 1119, MATH 1401, MATH 1402.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial and laboratory one hour a week.

BIT 1200 [0.5 credit]
Mathematics I for PLT
Limits. Differentiation of the elementary functions, including trigonometric functions. Rules of differentiation. Applications of differentiation: max-min problems, curve sketching, approximations. Introduction to integration: definite and indefinite integrals, areas under curves, fundamental theorem of calculus.
Precludes additional credit for BIT 1000, BIT 1100, MATH 1002, MATH 1004, MATH 1007, MATH 1009, MATH 1401/ECON 1401, MATH 1402/ECON 1402.
Prerequisite(s): Ontario Grade 12 Mathematics: Advanced Functions; or MATH 0005 and MATH 0006; or equivalent. Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

BIT 1201 [0.5 credit]
Mathematics II for PLT
Systems of linear equations; vector space of n-tuples, subspaces and bases; matrix transformations, kernel, range; matrix algebra and determinants. Dot product. Complex numbers (including de Moivre's Theorem, and n-th roots). Eigenvalues, diagonalization and applications.
Note: MATH 1119 is not an acceptable substitute for BIT 1201.
Precludes additional credit for BIT 1001, BIT 1101, MATH 1102, MATH 1104,MATH 1107, MATH 1119, MATH 1401/ECON 1401, MATH 1402/ECON 1402.
Prerequisite(s): Ontario Grade 12 Mathematics: Advanced Functions, or MATH 0005, or equivalent, or permission of the School. restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial and laboratory one hour a week.

BIT 1203 [0.5 credit]
Physics for Photonics I
Mechanics, properties of matter, thermodynamics. Applications chosen in part from the life sciences.
Precludes additional credit for BIT 1002, PHYS 1001, PHYS 1003, PHYS 1007.
Prerequisite(s): (i) Grade 12 Mathematics: Advanced Functions or equivalent; or (ii) Grade 12 Mathematics: Calculus and Vectors or equivalent, or MATH 1007 or BIT 1200 (may be taken concurrently); or (iii) permission of the Department.Restricted to students in the B.I.T. degree program.
Lectures three hours a week, laboratory or tutorial three hours a week.

BIT 1204 [0.5 credit]
Physics for Photonics II
Electricity and magnetism, DC and AC circuits, wave motion and light. Elements of modern physics. Applications chosen in part from the life sciences.
Precludes additional credit for BIT 1003, PHYS 1002, PHYS 1004, PHYS 1008.
Prerequisite(s): BIT 1203 or PHYS 1001 or PHYS 1003 or PHYS 1007 or permission of the Department. Restricted to students in the B.I.T. degree program.
Lectures three hours a week, laboratory or tutorial three hours a week.

BIT 1400 [0.5 credit]
Introduction to Programming and Problem Solving
Introduction to basic concepts of algorithm design and computer programming in C/C++. Topics include computer architecture, algorithms and pseudocode, basic operators, variables and functions, program control with iteration and conditionals, I/O operations, text processing, structures, arrays, pointers, and debugging.
Precludes additional credit for IMD 1003, NET 1000 and PLT 1000.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory three hours a week.

BIT 2000 [0.5 credit]
Introduction to Statistics
This course covers data analysis, introduction to probability theory, some standard discrete and continuous distributions and their application to interval estimation and significance testing, computational aspects of statistics.
Precludes additional credit for BIT 2100 (no longer offered), BIT 2300 (no longer offered), ECON 2201, ENST 2006, GEOG 2006, STAT 2507, STAT 2606, and STAT 3502.
Prerequisite(s): restricted to students in the BIT degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

BIT 2001 [0.5 credit]
Introduction to Business
An overview of the most fundamental business functions. The management of people, human resources, marketing, accounting and finances, business law and operations.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures: three hours a week.

BIT 2002 [0.5 credit]
Marketing in the IT sector
Basic problems and practices in marketing. Marketing strategies, planning, packaging, branding and promotion at the level of the individual firm; distribution channels.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week.

BIT 2004 [0.5 credit]
Differential Equations For Photonics
First-order equations, linear second- and higher-order equations, linear systems, stability of second-order systems.
Precludes additional credit for MATH 1005, MATH 2404, and MATH 2454.
Prerequisite(s): BIT 1201 and BIT 2007 or MATH 1002 and MATH 1102 or MATH 1107 and MATH 2007, either previously or concurrently; or equivalents; or permission of the School. Restricted to students in the B.I.T. degree program.
Lectures three hours a week, laboratory three hours a week.

BIT 2005 [0.5 credit]
Multivariate Calculus for Photonics
Curves and surfaces. Polar, cylindrical and spherical coordinates. Partial derivatives, gradients, extrema and Lagrange multipliers. Exact differentials. Multiple integrals over rectangular and general regions. Integrals over surfaces. Line integrals. Vector differential operators. Green's Theorem, Stokes' theorem, Divergence Theorem. Applications.
Also listed as MATH 2004.
Precludes additional credit for MATH 2000, MATH 2004 and MATH 2008.
Prerequisite(s): BIT 2004 or MATH 1005 or MATH 2007; and ii) BIT 1201 or MATH 1104 or MATH 1107; or permission of the School. Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial one hour a week.

BIT 2006 [0.5 credit]
Elective
Students must choose from among a list of approved Electives at Algonquin College.
Precludes additional credit for BIT 3003 (no longer offered).
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, or as arranged.

BIT 2007 [0.5 credit]
Mathematics III for PLT
Techniques of integration, improper integrals. Polar coordinates, parametric equations. Indeterminate forms, sequences and series, Taylor's formula and series.
Precludes additional credit for MATH 1002, MATH 1005, MATH 2007.
Prerequisite(s): BIT 1200 or MATH 1004; or permission of the School. restricted to students in the B.I.T. degree program.
Lectures: three hours a week, tutorial/laboratory one hour a week.

BIT 2400 [0.5 credit]
Intermediate Programming
Introduction to object-oriented programming using C++ language. Topics include detailed study of pointers and structures, encapsulation of data and code through objects and classes, inheritance, polymorphism, object- oriented program design, class libraries, user interface objects and event-driven systems.
Precludes additional credit for IMD 2004, NET 2006 and PLT 2004.
Prerequisite(s): BIT 1400. Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory three hours a week.

BIT 3999 [0.0 credit]
Co-operative Work Term

BIT 4000 [0.5 credit]
Directed Studies
A course of independent study under the supervision of a member of the School of Information Technology, open only to students in the B.I.T. program. Students are required to obtain their supervisor's written approval prior to registration and are limited to one such course in their programs.
Prerequisite(s): permission of the School of Information Technology.

BIT 4001 [0.5 credit]
Selected Topics in Information Technology
Topics not ordinarily treated in the regular course program due to their contemporary subject matter. The choice of topics varies from year to year.
Prerequisite(s): third-year standing in the BIT Program or permission of the department.
Lecture three hours a week.

Interactive Multimedia and Design (IMD) Courses

IMD 1000 [0.5 credit]
Introduction to Interactive Multimedia Design
Overview of interactive multimedia design including copyright, user-centred design, web design and mark-up languages, general logic design, multimedia project management, design processes for animated film, video game development, visual effects in movies, ethics and current trends in the field.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lecture three hours a week.

IMD 1001 [0.5 credit]
Visual Communication
Visual communication techniques commonly used to draft concepts and ideas to support scripts for film, animation, HCI, and/or game development. Topics include:storyboarding, composition, vanishing point, line quality, visual timing, perspective, depth of field, body language and life drewing. A digital drawing tablet is required.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Workshop three hours a week.

IMD 1002 [0.5 credit]
Visual Dynamics
Fundamentals of composition with emphasis on realistic rendering. Students learn how to execute thumbnails and design comprehensives. Topics include illustration, type, colour, texture, proximity and unity, alignment, repetition and continuity, contrast, size relationships, balance, rhythm, negative space, cropping and view selection.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Workshop three hours a week.

IMD 1004 [0.5 credit]
Design Processes
Design fundamentals using industry standard software techniques and workflow are explored. Topics include: gestalt principles, grids systems, colour, texture, raster and vector image production, and typography. Students design for publication to output such as Web, print, and electronic book formats. Required digital drawing tablet.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Workshop three hours a week.

IMD 1005 [0.5 credit]
Web Development
Introduction to Web development. Combining graphics, text, audio, and video to create Web sites; developing different, major working Web sites on an individual basis and in groups, using valid xHTML, cascading style sheets (CSS), JavaScript and XML structures.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Workshop five hours a week.

IMD 2000 [0.5 credit]
Multimedia Data Management
Covering back-end processing and organisation of multimedia content; focusing on databases and database design, server-side scripting, structured query language (SQL), dynamic page loading, storage and compression of media, media network considerations (including media streaming), digital watermarking and rights management.
Precludes additional credit for IRM 2000.
Prerequisite(s): BIT 1400 and IMD 1005.
Lecture three hours a week, tutorial/ laboratory two hours a week.

IMD 2003 [0.5 credit]
Audio and Video
The creation, production and editing of audio and video for multimedia applications. Topics include single camera recording and capture techniques through to post-production editing. Emphasis is placed on production and operation skills while adhering to industry standard costs and deadlines.
Prerequisite(s): second-year standing in the IMD program.
Workshop four hours a week.

IMD 2005 [0.5 credit]
Motion Graphics
Visual communication through kinetic elements; focusing on dynamic form, speed, rhythm, and quality of motion. Topics include basic animation principles, rhythm and timing, design and composition, kinetic typography, sound synchronization, storyboard development, compositing, and rendering for target platforms.
Precludes additional credit for IMD 2002 (no longer offered).
Prerequisite(s): second-year standing in the IMD program.
Lecture/ workshop three hours a week.

IMD 2900 [1.0 credit]
Design Studio 1
Web application development. Using a multidisciplinary approach, teams develop a comprehensive, Web-based application. Topics include users, storyboarding, data management, prototyping, project and content management, marketing, testing, and product evaluation. Client- and server-side technologies will be used to enhance functionality.
Prerequisite(s): second-year standing in the IMD program.
Studio/lecture eight hours a week.

IMD 3001 [0.5 credit]
Aspects of Product Design Methodology
Important issues in designing successful computerized products, including design guidelines, usability testing and user-needs analysis. Experienced designers and researchers from industry participate.
Also listed as PSYC 4800.
Prerequisite(s): third-year standing in the IMD program.
Lectures three hours a week.

IMD 3002 [0.5 credit]
3D Computer Graphics
Technical aspects of 3D computer graphics. Homogeneous transformations, viewing pipeline, cinematography, modeling techniques (explicit and implicit), scene composition, level of detail methods, advanced lighting techniques (BRDF, IBL, subsurface-scattering), 2D/3D texturing, local/global illumination, match-moving, rendering methods, and shaders.
Prerequisite(s): BIT 1101, BIT 2400 and IMD 3900.
Lectures three hours a week, tutorial/laboratory two hours per week.

IMD 3003 [0.5 credit]
Communication Skills for IMD
Development of competence in written and oral communication related to multimedia design. Needs analyses, use-case scenarios, development and management of content, technical reports, and related project documents; oral presentations.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lecture and tutorial three hours a week.

IMD 3004 [0.5 credit]
Human Computer Interaction and Design
Introduction to concepts centered on Human-Computer Interaction from hardware and software perspectives. Topics include design principles, usability principles and engineering, solving user-centred problems, device interaction, and graphical user interface design (2D and 3D interfaces).
Prerequisite(s): third-year standing in the IMD program.
Lectures three hours a week.

IMD 3005 [0.5 credit]
Sensor-Based Interaction
Development of interactive applications that connect the physical and virtual space. Topics include using external devices and sensor hardware, sensing objects and people, gestural input, computer vision, processing of live audio input, and networked software and devices. Precludes additional credit for IMD 2001 (no longer offered).
Prerequisite(s): BIT 2400.
Lecture/ workshop four hours a week.

IMD 3900 [1.0 credit]
Design Studio 2
Introduction to the artistic perspective on 3D graphics and animation. Practical studio sessions; use of popular modeling and animation packages; modeling, texturing, materials, cameras, lighting, keyframe animation, rendering.
Prerequisite(s): third-year standing in the IMD program.
Studio/lecture eight hours a week.

IMD 3901 [1.0 credit]
Design Studio 3
Device design. Studio-based projects focus on one or more special areas in multimedia, information and interaction design. Device design, form factors, information appliances, and computer-supported collaborative work.
Prerequisite(s): third-year standing in the IMD program and IMD 2900.
Studio/lecture eight hours a week.

IMD 4002 [0.5 credit]
Technology and Culture
An examination of the relationship between communication technology and society. The course examines the factors that contribute to changes in the collection, storage and distribution of information and the cultural implications of these changes.
Prerequisite(s): third-year standing in the IMD program.
Seminar three hours a week.

IMD 4003 [0.5 credit]
3D Computer Animation
Advanced topics in computer animation: principles of animation, motion capture, forward/inverse kinematics, key-framing, motion editing/retargeting/interpolation, soft-body animation (including shape interpolation), character animation (walking/locomotion, rigging, weighting, and facial animation), particle systems, dynamic systems (cloth, fluid, and hair), behavioural and procedural animation.
Prerequisite(s): IMD 3002 and IMD 3900.
Lecture three hours a week, tutorial/laboratory two hours a week.

IMD 4005 [0.5 credit]
Advanced Topics in Multimedia
Advanced topics in multimedia industry not ordinarily treated in the regular course program due to their contemporary subject matter. The choice of topics varies from year to year.
Precludes additional credit for IMD 4004 (no longer offered).
Prerequisite(s): fourth-year standing in the IMD program.
Lecture three hours a week.

IMD 4901 [1.5 credit]
Senior IMD Project
Student-initiated design project, developed in association with a project supervisor, and external industry advisor, supported by a written report (with printed and electronic versions), seminar discussions, and appropriate methods of two and/or three- dimensional representation. All proposals must be approved by the Program Project Committee.
Prerequisite(s): IMD 2900, IMD 3900,IMD 3901 and fourth-year standing in the IMD program.
Tutorial hours arranged.

IMD 4902 [1.0 credit]
Design Studio 4
Lectures and projects on interactive multimedia systems for art and entertainment, especially computer games, covering the production process from idea to design, development and testing, and also discussing related topics and technologies such as management skills, character and story development, game engines, and online games.
Precludes additional credit for IMD 4900.
Prerequisite(s): IMD 2900, IMD 3002 and fourth-year standing in the IMD program.
Studio/lecture eight hours a week.

Network Technology (NET) Courses

NET 1001 [0.5 credit]
Computer Technology Basics
Construction and function of PCs. Introduces technical concepts and terminology relating to system boards, system busses, input/output devices, memory, microprocessors and peripherals. Interaction of software and hardware; data storage; performance issues.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures two hours a week, tutorial/laboratory two hours a week.

NET 1002 [0.5 credit]
Networking Fundamentals
Foundation knowledge for computer networks and communications. Topics include basic network design, layered communications models, IP addressing and subnets, and industry standards for networking media and protocols, with an emphasis on TCP/IP protocol suite and Ethernet environments.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 1004 [0.5 credit]
Assembly and Machine Language
Structured approach to assembly language programming. Topics include data and address registers, data and address busses, condition code register and stack pointers, machine code format, instruction sizes, operand encoding, translation of source code into machine language, and how the processor executes instructions.
Also listed as PLT 1007.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

NET 1006 [0.5 credit]
Routing and Switching
Introduction to routing and switching concepts, VLANs and routing protocols with RIP and single-area OSPF as examples. Topics include configuring routers and switches and resolving common configuration and reachability issues.
Precludes additional credit for NET 1005 (no longer offered).
Prerequisite(s): NET 1002.
Lecture three hours a week, tutorial/laboratory three hours a week.

NET 2000 [0.5 credit]
Intermediate Networking
Architecture, components and operations of routers and switches in larger and more complex networks. Topics include configuration and troubleshooting of OSPF (with introduction to multi-area), EIGRP, STP, redundancy techniques and WiFi in SOHO environments.
Prerequisite(s): NET 1006.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 2001 [0.5 credit]
Wide Area Networking
Theory and technologies extending LANs to WANs including the relevant networking architectures and services. Data link protocols for WAN, network security, tunneling, VPNs and network monitoring, with a focus on implementation and troubleshooting.
Prerequisite(s): NET 2000.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 2002 [0.5 credit]
Desktop & Server Environments
Using Windows Server, study features such as file system, system utilities, memory management, boot process troubleshooting and UI customizations. Client-server architecture is examined with a focus on server configuration and administration, connection to a domain, remote desktop, and services including DHCP, DNS and Active Directory.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lecture two hours a week, tutorial/laboratory two hours a week.

NET 2003 [0.5 credit]
Linux Networking
Introduction to Unix and Linux operating systems, the command line, and network server operating environments. Students study Unix/Linux as a network server, including the configuration of services and protocols such as DNS, NTP, SSH, SMB, SMTP, POP3, IMAP, HTTP, and DHCP. Basic server security is introduced, including the creation of firewalls.
Prerequisite(s): NET 2002.
Lecture two hours a week, tutorial/laboratory two hours a week.

NET 2004 [0.5 credit]
Communication Skills for NET
Development of competence in written and oral communication in relation to network design, development, and management. Focus on technical reports, proposals, and other related project documents; formal and informal oral presentations.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lecture and tutorial three hours a week.

NET 2007 [0.5 credit]
Basics of Transmission Systems
Introduction to the physical layer of digital communication. Coverage of the transmission media (copper, fiber, cable, wireless), modulation, coding, equalization and synchronization. Examples: dial up modems, ADSL, Ethernet, T-carrier, Cable modem, SONET and wireless LAN. Factors affecting transmission error rates. Lab and field test equipment.
Prerequisite(s): BIT 1003.
Lectures three hours a week, tutorial/laboratory three hours a week.

NET 3000 [0.5 credit]
Database Concepts and SQL
Concepts and fundamentals of relational database systems. Students learn how to design relational databases starting from a conceptual data model, following accepted logical and physical design principles. Topics include normalisation, referential integrity, SQL, DDL and SQL DML & ODBC and data extraction/filtering techniques.
Prerequisite(s): second-year standing in the Networking program.
Lecture two hours a week, tutorial/laboratory two hours a week.

NET 3001 [0.5 credit]
Real-time Systems
Principles of event-driven systems, review of computer organization; parallel and serial interfaces; programmable timer; I/O methods; polling and interrupts. Real-time kernels. Critical design consideration: concurrency, dead lock, synchronization. Maintaining and improving system performance. Programming exercises in low and high level languages.
Prerequisite(s): NET 1004 and BIT 2400.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3004 [0.5 credit]
Data Structures
Specification and design of abstract data types and their implementation as stacks, queues, trees, tables and graphs. Common and useful examples. Parsing and finite state machines. Analysis of algorithms, recursion, re-entrance. Special focus: abstraction, interface specification and hierarchical design using object-oriented programming.
Precludes additional credit for PLT 3010.
Prerequisite(s): BIT 2400.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3006 [0.5 credit]
Network Management and Measurements
Network management fundamentals, standards, and protocols. The Simple Network Management Protocol (SNMP). Structure of Management Information and MIB. SNMP management challenges and the need for real-time measurements. Introduction to tools and applications for network measurements and monitoring.
Prerequisite(s): third-year standing in the Networking program.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3007 [0.5 credit]
Network Security
Basics of Information Technology security. Students are introduced to the goals of IT security, common threats and countermeasures including firewalls, Intrusion Detection and Prevention Systems (IDPS) and virtual private networks. Several operating environments will be studied as examples. Also includes a section on computer ethics.
Prerequisite(s): NET 2001.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3008 [0.5 credit]
Advanced Network Routing
Routing IP at the enterprise level, within and between, autonomous systems. Advanced control and optimization of routing protocols and manipulation of traffic paths with a focus on multi-area OSPF and EIGRP. Working knowledge of Internet reachability via BGP.
Prerequisite(s): NET 2001.
Lectures three hours a week, tutorial/laboratory three hours a week.

NET 3010 [0.5 credit]
Web Programming
Architectures, protocols and languages used to develop dynamic Web content, including HyperText Markup Language (HTML, DHTML), Universal Resource Identifiers (URI) and HyperText Transport Protocol (HTTP) and Common Gateway Interface (CGI). JavaScript and Java are used to model cross-platform Web programming.
Prerequisite(s): BIT 2400, NET 3000.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3011 [0.5 credit]
Advanced Network Switching
VLANs and inter-VLAN routing in a multilayer switched environment. Variants of STP and the use of related enhancements. Techniques for network redundancy and load balancing. Securing a switched infrastructure. Architectures and techniques for delivering converged and multimedia traffic (voice, video) in the enterprise.
Prerequisite(s): NET 2001.
Lectures three hours a week, tutorial/laboratory three hours a week.

NET 3012 [0.5 credit]
IP Architectures and Solutions
An exploration of various deployment options that can be implemented atop an IP network core. The focus is on techniques, technologies and architectures that serve to enhance IP delivery and connectivity, or provide a service leveraging the IP infrastructure. Includes Layer 2 and 3 VPNs.
Prerequisite(s): NET 3008.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 3900 [0.5 credit]
Wireless Networks
Study of 802.11 protocol family, Wi-Fi, and authentication protocols. Security and other design issues for WLANs. Deployment considerations for mobile networks, hotspots, bridges and access points. Wireless network management challenges.
Prerequisite(s): third-year standing in the Networking program.
Lectures two hours a week, tutorial/laboratory three hours a week.

NET 4000 [0.5 credit]
Emerging Network Technologies
Overview of technologies, protocols and techniques related to Information Technology networking that are either in their early stage of adoption or are not yet mainstream (i.e. beta or prototype stage). Focus will vary from year to year to reflect the evolutionary nature of this domain.
Prerequisite(s): fourth-year standing in the Networking program or permission of the instructor.
Also offered at the graduate level, with different requirements, as ITEC 5110, for which additional credit is precluded.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 4001 [0.5 credit]
Network Simulation
Introduction to discrete event simulation; fundamental stochastic models for networking; queueing theory; deterministic algorithms for networking; confidence intervals; introduction to network modeling. Use of simulation tools to develop and test scenarios including traffic monitoring, congestion, routing protocols, resource utilization and growth planning.
Prerequisite(s): BIT 2000.
Also offered at the graduate level, with different requirements, as ITEC 5113, for which additional credit is precluded.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 4003 [0.5 credit]
Computer Systems Architecture
History and evolution of computers. Models and functional descriptions of CPU, bus, memory, I/O. Internal data transfer and storage concepts. Bus protocols. Memory organization and cache principles. Digital logic and simple logic designs of CPU, buses, memory. Concepts of virtual machines, parallel computing, cloud computing.
Prerequisite(s): third year standing in the Networking program, NET 2003 and NET 3001.
Lectures three hours a week, tutorial/laboratory one hour a week.

NET 4005 [0.5 credit]
Networked Applications
Architectures for computing in modern data networks that adopt the Internet architecture. Topics covered include socket programming, RPC and RMI. Client-server and peer-to-peer models. Emerging application architectures.
Prerequisite(s): NET 3004 and NET 3010.
Also offered at the graduate level, with different requirements, as ITEC 5114, for which additional credit is precluded.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 4007 [0.5 credit]
Multimedia Networking
Audio and video compression. H.261, JPEG, MPEG and DVI. Accessing audio and video from a web server. Real Time Streaming Protocol (RTSP). Multimedia operating systems. Multimedia database. Network support for multimedia applications. Multimedia synchronization.
Prerequisite(s): fourth-year standing in Networking program or permission of the instructor.
Also offered at the graduate level, with different requirements, as ITEC 5111, for which additional credit is precluded.
Lectures three hours a week, tutorial/laboratory two hours a week.

NET 4009 [0.5 credit]
Troubleshooting IP Networks
Integrates planned maintenance and troubleshooting techniques, including, tools, applications and formalized methodologies. Study of issues in focused areas (such as routed vs. switched environments, addressing services, performance, security, multimedia), culminating in problem resolution throughout a complex enterprise network.
Prerequisite(s): NET 3011, NET 3008.
Lectures three hours a week, tutorial/laboratory three hours a week.

NET 4010 [0.5 credit]
Secure Mobile Networking
The concept, principle and rationale of mobile networking. Mobile network architecture, protocols, mobility management, routing and mobile TCP/IP; Security challenges, vulnerabilities and threats in mobile networks; Security defense techniques and countermeasures in mobile networks.
Prerequisite(s): fourth-year standing in Networking program or permission of the instructor.
Also offered at the graduate level, with different requirements, as ITEC 5112, for which additional credit is precluded.
Lectures three hours a week, tutorial/laboratory one hour a week.

NET 4901 [1.0 credit]
Network Technology Project
This course provides the opportunity to apply knowledge gained in previous courses towards the design and implementation of a major Networking related project. Working in teams or as individuals under the direction of faculty members, students undertake projects internally or in collaboration with industry.
Prerequisite(s): fourth-year standing in the Networking program.
Tutorial hours arranged.

Photonics and Laser Technology (PLT) Courses

PLT 1002 [0.5 credit]
Trends in Photonics
Survey of the history and future of photonics. Photonics benefits and impact on technology and society. Emerging applications of photonics in industry and commercial products. The forces (business, social, political, economic, technical, and educational) that influence the development, adoption and success or failure of technologies.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures one hour a week, tutorial/laboratory two hours a week.

PLT 1003 [0.5 credit]
Optics/Optical Fibers I (Principles)
Principles of optics, optical fiber, waveguides and hands-on experience with optical components. Optical fiber manufacturing and variety of industrial applications. Topics covered include: optical sources, detectors, fiber modes and mode-coupling, couplers, multiplexers, optical amplifiers, physical layer of optical networks, dispersion and nonlinear effects management.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures / laboratory or tutorial four hours a week.

PLT 1005 [0.5 credit]
Introduction to Optics
Physics of waves, optics and light propagation through lectures and lab experiments. Geometrical optics, refraction and reflection, interference, diffraction and polarization, thin lens equation, laser beams, Michelson interferometer, birefringence, and Abbe theory of imaging. Electromagnetic spectrum, quantum nature of light, photons, and photoelectric effect.
Prerequisite(s): BIT 1203, restricted to students in the B.I.T. degree program.
Lectures / laboratory or tutorial five hours a week.

PLT 1006 [0.5 credit]
Introduction to Automation and Simulation
Introduction to basic programming in both the Matlab and Labview environments. Program development, basic structures (loops, control structures), I/O, data visualization and graphing will be covered. Students will learn to use Labview to develop basic applications and model simple physical systems with Matlab.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lectures two hour a week, tutorial/laboratory three hours a week.

PLT 1007 [0.5 credit]
Assembly and Machine Language
Structured approach to assembly language programming. Topics include data and address registers, data and address busses, condition code register and stack pointers, machine code format, instruction sizes, operand encoding, translation of source code into machine language, and how the processor executes instructions. Also listed as NET 1004.
Prerequisite(s): Restricted to students in the B.I.T. degree program.
Lectures three hours a week, tutorial/laboratory one hour a week.

PLT 2001 [0.5 credit]
Fundamentals of Light Sources
Introduction to incoherent light sources and lasers. Lasers operation, energy levels, quantum mechanics basics. Pumping/excitation, population inversion, laser cavity design, gain and loss, and characteristics of laser emission. An extensive lab manual of relevant experiments, variety of lasers, spectrometers, and detection equipment will be used.
Prerequisite(s): BIT 1201. Restricted to students in the BIT degree program.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 2002 [0.5 credit]
Fiber Optics Communications I
Fiber-laser implementation and optical networks, topologies, OSI, SONET/SDH, synchronous payload envelope, virtual tributaries, optimized mapping techniques, and optical carriers (OC-n/STM-m). Extensive lab manual and hands-on experience using state-of-the-art Optophotonics Lab to work on OAM&P, facility/ equipment, synchronization, bandwidth management, and performance monitoring and other functionalities.
Prerequisite(s): PLT 2000.
Lectures two hours a week, tutorial/laboratory three hours a week.

PLT 2003 [0.5 credit]
Laser Systems
Laser theory, devices and systems. Safety procedures, laser power supplies, and laser system applications. Solid state, gas, and other types of lasers. Basic material processing, micro machining, bio/medical, and military applications will be covered. Hands-on experience with advanced laser equipment in lab.
Prerequisite(s): PLT 2001.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 2005 [0.5 credit]
Circuits and Signals
Students learn properties of electricity and measurement techniques. Topics covered include RMS, average, applied, peak-to-peak and instantaneous values. Lab experiments deal with RC and RL circuits and LC filters. RLC circuits, and series and parallel resonance are also covered.
Prerequisite(s): BIT 1204 or PHYS 1004 or PHYS 1002 Restricted to students in the BIT degree program.
Lectures two hours a week, laboratory and problem analysis three hours a week.

PLT 2006 [0.5 credit]
Semiconductors
Fundamentals of logic circuitry in digital systems are studied including basic logic gates, Boolean algebra, signal decoding, logic circuit design, flip-flop circuits, timers and counters. The proper use of semi-conductor components is demonstrated through the use of laboratory experiments.
Prerequisite(s): PLT 2005. Restricted to students in the B.I.T. degree program.
Lectures two hours a week, laboratory and problem analysis three hours a week.

PLT 2008 [0.5 credit]
Manufacturing Photonics Components
Manufacturing techniques and methods used to produce photonics components and devices/systems. Micro assembly, adhesives, optical tests and measurement, lean manufacturing and quality control standards (Telcordia). Laboratory exposure to optical component production processes: grinding, polishing, coating, mounting, tolerance and accuracy.
Precludes additional credit for PLT 1004 (no longer offered).
Prerequisite(s): PLT 1002. Restricted to students in the B.I.T. degree program.
Lectures / laboratory or tutorial four hours a week.

PLT 3000 [0.5 credit]
Fiber Optics Communications II
Operation, management and maintenance of metro/long haul optical network elements and systems. Hands-on skills using GUI, Transaction Language One (TL1), optical network management to perform line and path protection, alarm provisioning, security and data communications, optical network backup and restore, load upgrade and installation management.
Prerequisite(s): PLT 2002.
Lectures two hours a week, tutorial/laboratory three hours a week.

PLT 3001 [0.5 credit]
Photonics Manufacturing Systems
Laser based manufacturing, measurement and control systems, further applications of laser machining, welding, emphasizing industrial real world systems. Extensive hands on laser lab experiments, measurement jigs, scanners, swept wave systems (SWS), motion stages, optics, wavelength measuring, pulse detection, oscilloscopes, digital spectrometers.
Prerequisite(s): PLT 3011.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 3002 [0.5 credit]
Real-time Systems
Principles of event-driven systems, review of computer organization; parallel and serial interfaces; programmable timer; I/O methods; polling and interrupts. Real-time kernels. Critical design consideration: concurrency, dead lock, synchronization. Maintaining and improving system performance. Programming exercises in low and high level languages.
Prerequisite(s): BIT 2400.
Lectures three hours a week, tutorial/Laboratory two hours a week.

PLT 3003 [0.5 credit]
Electro Magnetics
Review of basic vector calculus followed by an introduction to electrostatics and magnetostatics. Maxwell's equations and EM wave solutions. EM waves in dielectrics media, reflection, refraction,Fresnel relations and Brewster angle. Introduction to guided waves emphasizing slab waveguides.
Prerequisite(s): (BIT 1204 or PHYS 1007 or PHYS 1002) and (BIT 2004 or MATH 2004)and (BIT 2005 or MATH 2004). Restricted to students in the BIT degree program.
Lecture and tutorial three hours a week.

PLT 3004 [0.5 credit]
Design of Optical Components and Systems
Optical ray-tracing for analysing systems of sources, lenses, mirrors, prisms, fibers, diffractive elements, MEMS. Zemax® fundamentals, pupils, aspherics, non-sequential tracing, aberrations, image metrics, optimization/merit functions. Applications: imaging, illumination, lasers. Trade-offs, mechanical constraints, tolerances and cost. Physical optics modeling of bean propagation. Near-field diffraction and waveguides.
Prerequisite(s): PLT 2000.
Lectures / laboratory or tutorial five hours a week.

PLT 3008 [0.5 credit]
Communication Skills for PLT
Development of competence in written and oral communication. Focus on technical reports, proposals, and other related project documents; formal and informal oral presentations.
Prerequisite(s): restricted to students in the B.I.T. degree program.
Lecture and tutorial three hours a week.

PLT 3009 [0.5 credit]
Project Management
Identification, selection, initiation, and organization of projects. Risk assessment, budget issues, communication, project scheduling, performance monitoring and control. Emphasis on practical techniques related to the field of photonics using case studies.
Prerequisite(s): third year standing in the Photonics and Laser Technology program.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 3010 [0.5 credit]
Data Structures
Specification and design of abstract data types and their implementation as stacks, queues, trees, tables and graphs. Common and useful examples. Parsing and finite state machines. Analysis of algorithms, recursion, re-entrance. Special focus: abstraction, interface specification and hierarchical design using object-oriented programming.
Precludes additional credit for NET 3004.
Prerequisite(s): BIT 2400.
Lectures three hours a week, tutorial/laboratory two hours a week.

PLT 4000 [0.5 credit]
Applications of Quantum Physics
Basic elements of quantum mechanics will be reviewed. Applications of quantum mechanics covered may include: quantum optics, teleportation, information, computing and cryptography.
Prerequisite(s): BIT 2004 or MATH 2404.
Lectures three hours a week, problem analysis two hours alternate weeks.

PLT 4001 [0.5 credit]
Optoelectronic Devices
Review of semiconductors, semiconductor lasers, detectors, photovoltaics. Electro, magneto and acousto-optic modulation devices. Transmitters, receivers, photo diodes, fiber sensors, and amplifiers, Mach–Zehnder interferometers. Polarization-mode dispersion. Experiments on non-linear optical elements, Sagnac and ring resonator, optical modulation.
Prerequisite(s): PLT 3004.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 4004 [0.5 credit]
Biomedical Photonics
Biological and medical photonics. Effect of light on biological systems, medical imaging, medical treatments, biological research and bio/medical applications. Laser manipulation of cells, laser surgery, and photo-therapy. Biophotonic lab experiments with scanning confocal microscopes, endoscopes , DNA scanners.
Prerequisite(s): PLT 3003.
Lectures / laboratory or tutorial four hours a week.

PLT 4006 [0.5 credit]
Image and Signal Processing
Developing and evaluating algorithms for extracting the necessary information signals. Topics include filter design, fast transforms, adaptive filters, spectrum estimation and modeling, sensor array processing, image processing, motion estimation from images, applications in biomed, computer-aided tomography, image restoration, robotic vision, and pattern recognition.
Prerequisite(s): BIT 2400.
Lectures two hours a week, tutorial/laboratory two hours a week.

PLT 4007 [0.5 credit]
Introduction to Solid State Physics
The study of materials via the techniques of solid state physics. Topics include bonding and structure of crystals, energy band in insulators, semiconductors, and metals. Electrical conductivity, optical properties, lattice vibration, elasticity, point defects and dislocations.
Precludes additional credit for PLT 3005 (no longer offered).
Prerequisite(s): PLT 4000.
Lectures three hours a week.

PLT 4900 [1.0 credit]
Photonics Research Project
Research project develops students' ability to direct own learning and pursue advanced study in variety of subjects. Select topic, perform literature search, theoretical background, preliminary measurements, calculations, and design. Present findings in a preliminary thesis. Encourage writing technical papers. Research opportunities with industry and academia.
Prerequisite(s): fourth-year standing.
Tutorial hours arranged.

Summer session: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at central.carleton.ca