School of Construction and Natural Resource Studies 1986-87 Calendar

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

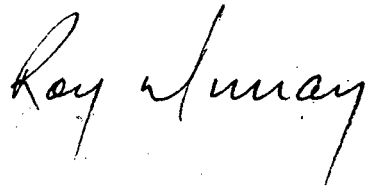
President's Message

The British Columbia Institute of Technology is on the threshold of an exciting new future, one which many of you hopefully will wish to share.

On April 1 1986, the well known and respected Pacific Vocational Institute and former British Columbia Institute of Technology were amalgamated as part of a long range plan by the provincial government to strengthen technological development. The new institute — BCIT — has been given a mandate to expand and revitalize its program profile, and to forge partnerships in training for British Columbians.

BCIT now offers a wide range of programs through the Schools of Health Sciences, Management Studies, Academic and Vocational Studies, Construction and Natural Resource Studies and Computing and Electro-Mechanical Studies. Links between these programs and to other institutions will enable us to offer a network of training opportunities to individuals desiring to develop careers that keep pace with the changing technological needs of today's work place.

We are forging partnerships in training with industry for apprenticeship and journeyman training and for co-op education, with universities for research and technological transfer and with colleges for post diploma programs. Over the coming months, we also plan to create an environment at BCIT where applied research can benefit our faculty and students as well as the businesses and industries we serve. With these ambitions, BCIT will become like no other learning institution — a unique experience from start to finish for all those who choose our programs. Opening this calendar may be, for you, the beginning of that unique experience.



ROY V. MURRAY,
P.Eng.,
President

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Changes in Curricula and Regulations

Although it is proposed to adhere to the programs of study as set forth in this calendar, the Institute reserves the right to make, without prior notice, whatever changes are deemed necessary to either the programs of study or the regulations. The Institute reserves the right to cancel any program.

Contents

General Information

Campus Locations

1. Burnaby, Main Campus — Full-time and Part-time Technology and Trades Courses and Programs

   3700 Willingdon Avenue
   Burnaby, B.C.
   V5G 3H2
   434-1610

   Office Hours — From late August to early December and early January to late April:
   0830–2030 Monday–Thursday
   0830–1630 Friday
   0830–1230 Saturday (except holiday weekends)

   Consult our advertising supplements for details of special evening opening hours.

2. Downtown Education Centre — Part-time Studies Technology Courses only

   549 Howe Street
   Vancouver, B.C.
   V3C 2C6
   687-4666

   Office Hours — When school is in session:
   0830–1830 Monday–Thursday
   0830–1630 Friday
   Otherwise 0830–1730 Monday–Friday

3. Surrey — Part-time Studies Technology Courses only

   Princess Margaret Senior Secondary School
   12870 72nd Avenue
   Surrey, B.C.
   V3W 2N1

   NOTE: While the Burnaby main campus and Downtown Education Centre offer year-round registration service for part-time studies courses, the Surrey location has limited registration services. Please see our advertising supplements for registration and course details for this location.

4. Maple Ridge — Trades courses and programs only

   Box 3000 (248th Street)
   Maple Ridge, B.C.
   V2X 8L3
   462-7131

5. Sea Island — Trades Avionics courses and programs only

   Vancouver International Airport (South)
   4440 Stark Street
   Richmond, B.C.
   V7B 1A1

Personal Data

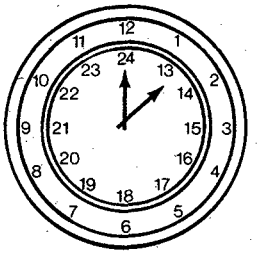
It is the student's responsibility to ensure all personal data on file with the Registrar's Office is accurate.

Refund Deadline

It is the student's responsibility to check the refund deadline dates. This information may be obtained at the information or registration areas in the Registrar's Office.

BCIT uses the 24-hour clock

0001–12:01 AM
0100–1:00
0200–2:00
0300–3:00
0400–4:00
0500–5:00
0600–6:00
0700–7:00
0800–8:00
0900–9:00
1000–10:00
1100–11:00
1200–12:00 noon



1300–1:00 PM
1400–2:00
1500–3:00
1600–4:00
1700–5:00
1800–6:00
1900–7:00
2000–8:00
2100–9:00
2200–10:00
2300–11:00
2400–12:00 midnight

Conduct and Attendance

It is assumed that all students enrolled at the British Columbia Institute of Technology are interested in pursuing an intense program of studies and that they are prepared to conform to all regulations.

1. Students are expected to conduct themselves in exemplary fashion at all times and pay diligent attention to their studies. If the School Dean or the Registrar believes a student's conduct is such that it is detrimental to the interests of the Institute, a recommendation may be made to the President to exclude the student from further attendance. The President has the final power to suspend or expel a student for disciplinary reasons, subject to the student's right to appeal this decision to a committee designated by the Board of Governors. A student who has been expelled or suspended for misconduct will not be admitted to the Institute grounds or buildings.

2. The Institute is not responsible for debts incurred by student organizations.

3. If through carelessness or negligence, a student damages Institute property, the student will be held responsible. If the damage is caused by students whose names are not known, the cost of repairing the damage may be assessed equally among all students enrolled at the Institute.

4. A student will not be permitted to borrow or remove any apparatus or tools except by written authority of the President or his delegate.

5. General supervision over all forms of entertainment given under the auspices of a student organization comes under the jurisdiction of the President.

6. It is the policy of BCIT to rely on the judgement of students to maintain a reasonable standard of dress and appearance. The choice of dress is left to the individual student, subject to the following considerations:

(a) in some field trips and laboratory situations, safety considerations require that special head gear, shoes or other clothing, and other safety equipment must be worn;
(b) where programs involve regular periods of scheduled experience, in industry or hospital for example, the student may be required to wear a uniform or otherwise dress himself/herself in the appropriate manner acceptable to the affiliating agency.

Based on experience to date, BCIT faculty believe that there is a positive relationship between general dress standards and employment of graduates. Faculty are prepared to advise students in the area of acceptable attire.

7. Regular attendance in lectures, seminars and laboratory periods is required of all students. If a student is absent for any cause other than illness for more than 10% of the time prescribed for any subject, he/she may be prohibited from completing the course. In case of illness or other unavoidable cause of absence, the student should communicate immediately with his department head, stating the cause of absence. Special regulations governing attendance in clinical experience areas are prescribed by the School of Health Sciences.

Academic and Administrative Personnel

R.V. Murray, C.D., B.Eng., M.Eng., P.Eng., President
D.J. Svetic, P.Eng., Vice President, Education
D.M. Macpherson, C.A., Vice President, Finance
L.T. McNeely, R.I.A., Vice President, Administration
P.W. Jones, Ph.B., Ph.L., Ph.D., Vice President, Student Services and Educational Support
H. Arthur, B.A.(Hons.), M.A., Dean, School of Academic and Vocational Studies
B. Gillespie, B.Sc., M.Sc., Ph.D., Dean, School of Health Sciences Studies
R. Hyde, B.S.A., M.Sc., P.Ag., Dean, School of Construction and Natural Resource Studies
J. Kyle, B.A., M.B.A., Ph.D., Dean, School of Management Studies
R. Sterne, B.A.Sc., P.Eng., Dean, School of Computing and Electro-Mechanical Studies
R. Bell, Director, Personnel/Employee Relations
D. Hickman, MAIBC, FRAIS, Director, Physical Plant
H. Hyde, B.A., M.A., Coordinator, Student Services
B. Copping, M.D., B.Sc., M.Sc., Director, Medical Services
P. Pick, B.A., M.L.S., Institute Librarian
J. Mitchell, Director, Recreation and Athletic Services
R. Curtis, B.Comm., M.B.A., R.I.A., Director, Learning Resources
G. Lloyd, B.Sc., Director of Development
N. Andrew, C.G.A., Director, Financial Services
W. Hepple, Director, Material Management
V. Karpinsky, B.A.(Hons.), Director, Student Housing
I. Nash, B.A., M.A., Manager, Bookstore
M. Mazziotti, Dipl.T., Registrar

Board of Governors

As of June 1985 the following members have been appointed as members and constitute the Board of Governors:

Chairman:
Malcolm C.J. Wickson, B.Comm., LL.B.
President
Mal-Cam Properties

Vice-Chairman:
Fleming Sondergaard
General Manager
Collins Manufacturing

Rose-Mary L. Basham, B.A., LL.B.
Partner, Mawhinney & Kellough
Barristers and Solicitors

Kenneth Frederick Harding
Secretary-Treasurer
Whillis-Harding Insurance Agencies Ltd.

Thomas Edward Kisling
President
Kisling Consulting Ltd.

James L. McPherson, F.C.A.

Frederick George Randall
Business Manager
International Union of Operating Engineers

Thomas A. Simons, P.Eng.
President
H.A. Simons (International) Ltd.
Consulting Engineers

Edward J. Sirney
Sirney & Son Stone Masonry Contractors Ltd.

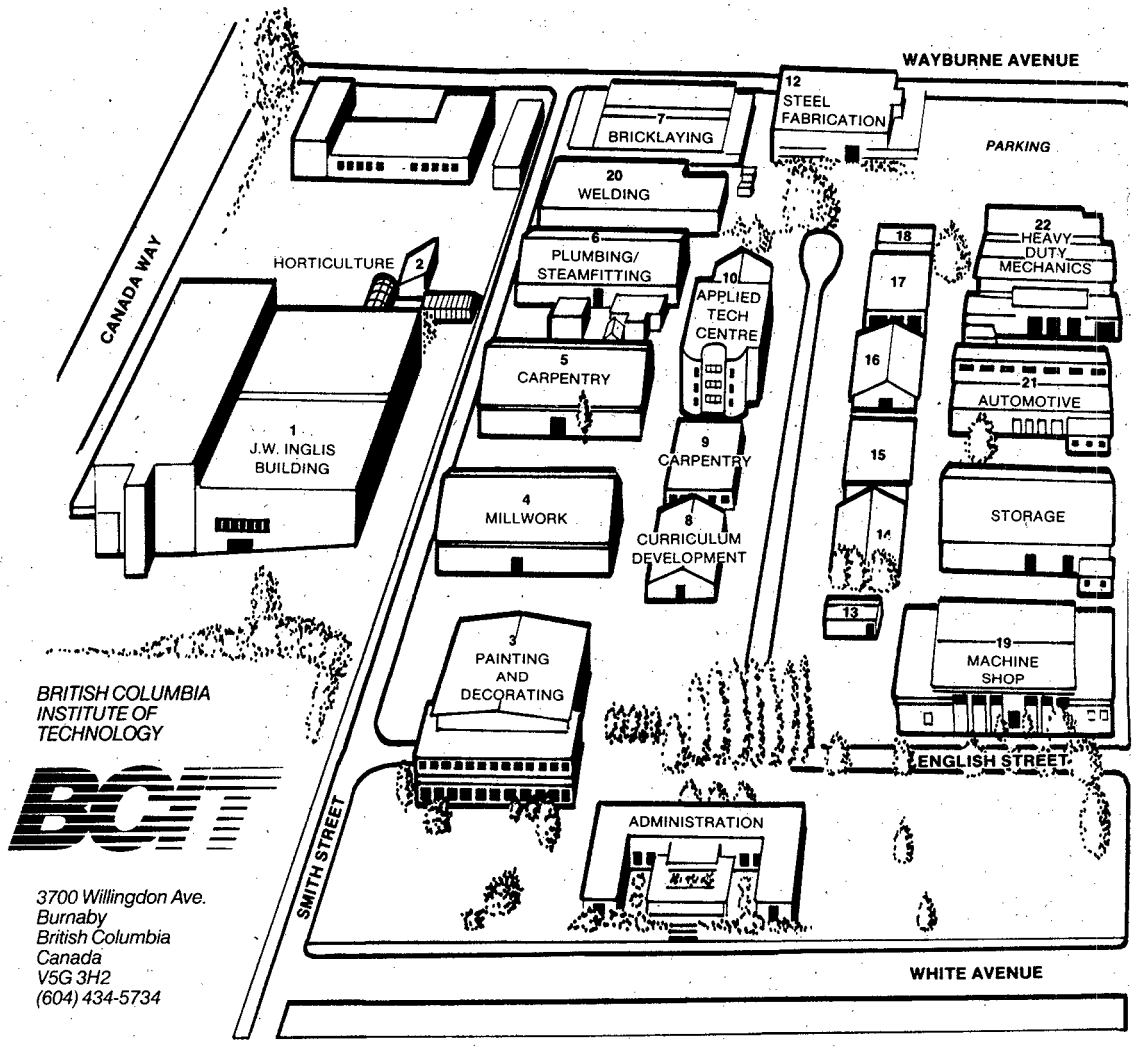
Vinod Sood, B.Sc., C.A.
President and Chief Executive Officer
Finning Tractor & Equipment Company Limited

Carole Taylor, B.A.
CKNW

Edward Arnold Taylor, C.G.A.
Comptroller
Crestbrook Forest Industries Limited

Keith Yorston
Chairman
Q.M. Industries Limited

Secretary to the Board:
Patricia Maertz



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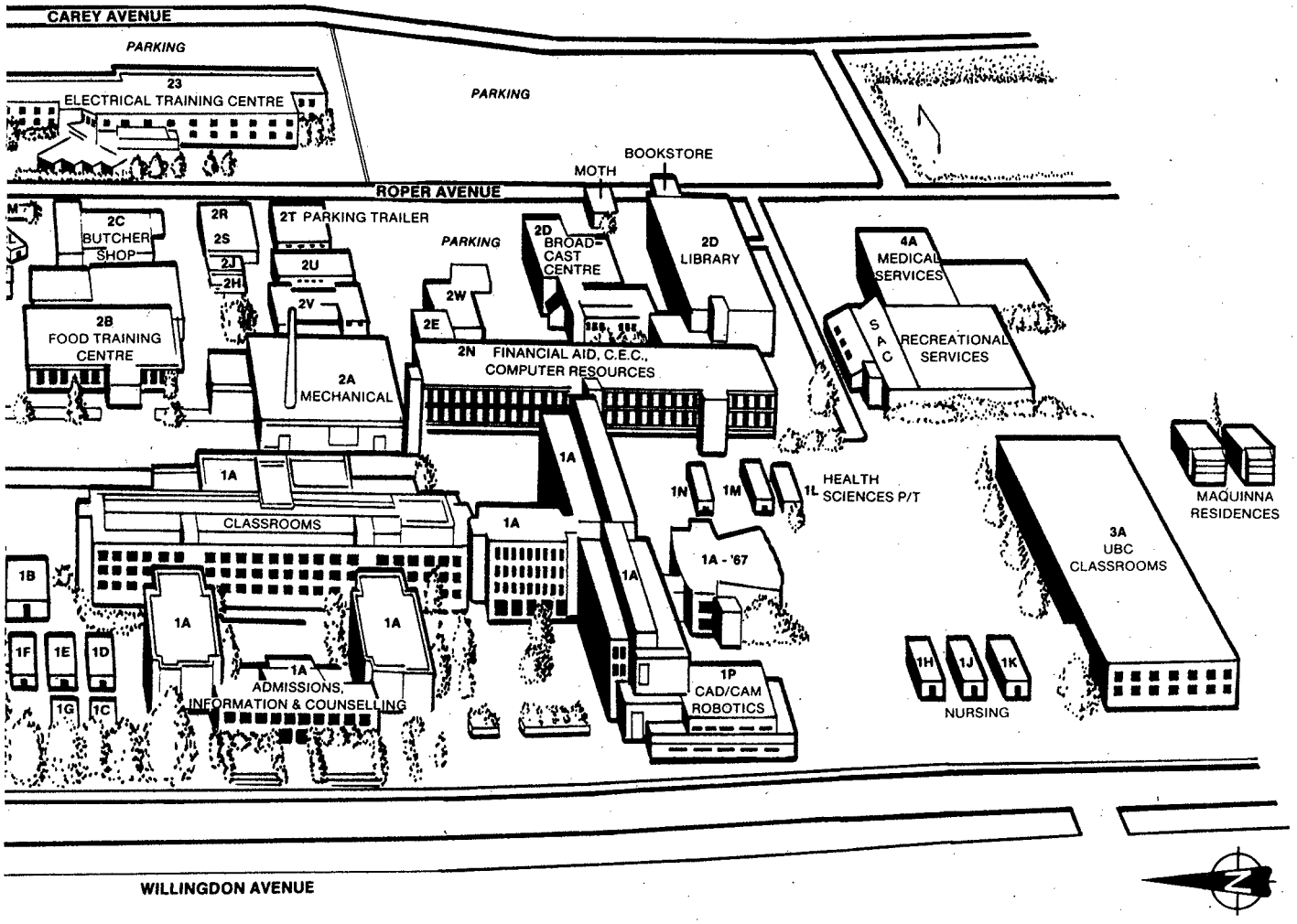
CAMPUS MAP



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Office of the Registrar

FULL-TIME TECHNOLOGY ADMISSIONS INFORMATION

Admissions Policy

BCIT's primary purpose is to provide high quality, post-secondary technological education for residents of British Columbia and Canada.

Applicant priority is first given to British Columbia residents who are Canadian citizens and landed immigrants and have lived in British Columbia for the immediate twelve months prior to enrolment; second priority is given to out-of-province Canadian citizens and landed immigrants, third priority is given to out-of-country applicants. BCIT does not accept applications from persons on visitors visas.

All applicants must provide documentary proof that they meet the necessary Institute and technology prerequisites. Applicants lacking specific prerequisite courses or adequate grades will be referred for upgrading.

Prompt and equitable attention will be given to all applications to ensure applicants maximum availability of the more than 50 excellent technological programs leading to National Diplomas. In those programs where the number of applications exceed available seats, BCIT will select those students deemed to have the best opportunity for success.

Entry to some programs is possible several times a year. For this information, check "when to apply".

Policy subject to change.

While all prospective students must be at least 16 years of age, there is no upper age limit.

Academic Requirements for Admission

Graduation from a senior secondary school with satisfactory grades, as prescribed by the British Columbia Ministry of Education. In addition, candidates must meet special technolopgy prerequisites. *See* **Technology Prerequisite**, this section, and individual technology sections.

English Language Proficiency

Since all BCIT students are expected to possess an acceptable level of language skill, applicants whose primary language is not English, may be required to demonstrate their competence in one of the following ways:

1. by scoring a minimum of 145 on the Vancouver Community College English Language Assessment Test;
2. by scoring a minimum of 550 on the TOEFL;
3. by completing Academic English 12 (B.C.) with C+ or better. English 12 Minimum Essentials is not acceptable;
4. by successfully completing English 099 at Vancouver Community College; or equivalent, or;
5. by individual assessment by the English Department.

To obtain an information bulletin which outlines world-wide test locations and application procedures, applicants should contact: Test of English as a Foreign Language, Box 889, Princeton, New Jersey, 08540, U.S.A.

For those B.C. applicants whose first language is English, who wish to complete the high school Communications program to meet BCIT's English requirement, the following combinations are acceptable for September 1987 admissions:

1. Communications 11 and 12 with a "B" standing in Communications 12;
2. English 11 and Communications 12 with a "C" standing in Communications 12;
3. Communications 11 and English 12 with a "C" standing in English 12.

Where a technology specifically requires a "C+" standing in English 12, this standing is required in 2 or 3 above.

Mature Student

1. A person not eligible for admission under any other category may apply as a mature student.
2. Admission under this category is at the discretion of the Registrar on the recommendation of individual Technology Department Heads. The Department Head must be satisfied that the applicant has sufficiently clear objectives, and can provide evidence of probable success in the technology of his/her choice. The Department Head may, at his/her discretion, require applicants to have an interview or take appropriate tests. Along with their application, applicants must submit a statement of intent outlining their reasons for applying. Enquiries regarding admissions under this category should be directed to individual Department Heads by the Registrar.
3. All applicants intending to take advantage of this admission procedure are strongly advised to contact the Office of the Registrar at least twelve months prior to the expected date of admission.
4. Mature students must submit all supporting documents with their applications.

Second Year Regional College Transfer

BCIT offers transfer programs for various technologies from recognized regional colleges within British Columbia. Further information may be obtained by directing your inquiry to the Office of the Registrar at BCIT.

Direct Entry

Those persons who have successfully completed one or more years of study at a level equal to, or higher than, that of a BCIT full-time day program may apply for direct entry into second or third term/level of a program, providing a seat is available, course content is similar and, in the opinion of the Registrar, the applicant's academic record justifies advanced standing.

Readmissions

Students may interrupt their studies after the completion of any term/level. However, an application form must be completed and submitted to the Office of the Registrar, to request readmission into the Institute.

Part-time Day Courses

Students may register in courses given in full-time programs subject to the approval of the technology head, space being available, and official proof that prerequisites have been met.

A student making application for part-time day classes must obtain the signature of the technology head and the instructor of each course, using the form "Application for Part-time Day Courses" available at the Office of the Registrar. Fees must be paid upon presentation of the completed form to the cashier. Completed forms should be submitted to Student Records, Office of the Registrar for processing.

Technology Prerequisites

School of Management Studies

Administrative Management Systems — Algebra 11 and English 12 both with a C+..

Broadcast Communications — All applicants must be able to type 25 wpm, and submit a short essay, approximately 500 words, detailing reasons for choosing Broadcasting as a career.

Broadcast Engineering — Graduation with a National Diploma of Technology in electronics, or equivalent work experience.

Business Administration — Graduation from a BCIT diploma program or a two year college program in an engineering or health technology, or equivalent.

Computer Systems — At least 6 grade 11 or 12 academic courses (Arts and Science), including English 12 and Algebra 11. For second year options, we specifically recommend Algebra 12 for Management Systems and Physics 11 and 12, and Algebra 12 for Engineering Systems.

Financial Management — Algebra 11 and English 12 with C+. Candidates who do not meet this requirement are to include with their application, a letter (with references) outlining their career objectives and reasons for selecting Financial Management to enable the departmental selection committee to consider their application.

Hospitality and Tourism Administration — English 12 and Algebra 11 both with a C+ standing.

Marketing Management — Algebra 11 and English 12 both with a C+ standing.

Operations Management — Algebra 11 with a C+ standing. Physics 11 is desirable.

Transportation/Distribution Management and International Major — Algebra 11 with a C+ standing. Physics 11 is desirable.

Note: Please refer to page 10 of the Admissions section, if you wish to be considered under the Mature Student category.

SEE PROGRAM DESCRIPTION PAGES FOR INDIVIDUAL PROGRAM NON-ACADEMIC PREREQUISITES.

School of Computing and Electro-Mechanical Studies

CAD/CAM — Algebra 12, Physics 11, Drafting 11.

Computer Systems — At least 6 grade 11 or 12 academic courses (arts and sciences), including English 12 and Algebra 11. Second year options: we specifically recommend Algebra 12 for Decision Systems and Physics 11 or 12 and Algebra 12 for Engineering Systems.

In the case of mature students, academic transcripts may be supplemented by relevant business experience, successful recent completion of relevant BCIT Part-time Studies courses with 75% or successful recent completion of relevant courses at other post secondary institutions with 75%. Candidates may be asked to write an aptitude test to aid in the selection process.

Electrical/Electronics — Algebra 12, Physics 11 and Chemistry 11 all with C+ standing.

Mechanical — Algebra 12 and Physics 11.

Mechanical Systems — Algebra 12 and Physics 11.

Robotics — Algebra 12 and Physics 11 both with C+ standing.

School of Construction and Natural Resource Studies

Building — English 12, Algebra 12 and Physics 11.

Civil and Structural — Algebra 12 and Physics 11.

Surveying — Algebra 12 and Physics 11.

Natural Resources

Biological Sciences — Algebra 12 and Chemistry 11.

Forest Resource — Algebra 11 with C+ standing; a Science 11 (Biology required for Fish, Wildlife and Recreation; preferred for Forestry); and one of Science 11, or a Science or Mathematics at the Grade 12 level.

Natural Resource Management — Graduation from a BCIT diploma program in an engineering or business technology. Baccalaureate degree in Bio-Science, Engineering, Geography or Geology will also be considered.

Lumber and Plywood — Algebra 12 and one science 11 (Biology, Chemistry or Physics).

Mining — Algebra 12, Physics 11 and Chemistry 11.

Natural Gas and Petroleum — Algebra 12, Physics 11 or Chemistry 11.

Chemical Sciences — Algebra 12 and Physics 11.

Note: Please refer to page 10 of the Admissions section, if you wish to be considered under the Mature Student category.

Important

Where an algebra course requirement is specified in Engineering Technology and Health Sciences, please note that Academic Math 12 completed before 1978 is an acceptable prerequisite.

SEE PROGRAM DESCRIPTION PAGES FOR INDIVIDUAL PROGRAM NON-ACADEMIC PREREQUISITES.

School of Health Sciences Studies

Biomedical Electronics and Electrophysiology — Algebra 12, Physics 11 and Chemistry 11 all with a C+ standing.

Diagnostic Medical Sonography — Completion of a two year allied health program such as Radiography, Nuclear Medicine Technology or General Nursing, or a Bachelor of Science or equivalent in a health-related science.

Environmental Health — Algebra 12, Physics 11 and Chemistry 12.

General Nursing (R.N.) — Under 23 years at time of entry: Senior secondary school graduation with: Chemistry 11, either Chemistry 12 or Biology 12 and English 12 all with a C+ standing; Algebra 11 with C standing. **Over 23 years at time of entry:**

Senior secondary school graduation or equivalent with: Chemistry 11, either Chemistry 12 or Biology 12, all with a C+ standing. English 12 with a C+ standing is desirable. The St. John Ambulance Standard First-Aid certificate is required by the end of term 1.

Health Information

Health Record Administrator: Algebra 12, Biology 12 and proficiency in typing (approx. 50 wpm).

Health Record Technician: Algebra 12, Biology 12 and proficiency in typing (approx. 50 wpm).

Medical Laboratory — The following First Year University-level courses (or their equivalent in a Community College) are the prerequisites for entry into the Medical Laboratory Technology program:

Biology	UBC 101 or 102
Chemistry	UBC 110 or 120
Physics	UBC 110 or 115
English	UBC 100*
Mathematics	UBC 3 credits at the Math 100 level**

A complete First Year Science Program. 15 credits at UBC (or its equivalent at a Community College) is required for entry into the program. Applicants who do not have the appropriate courses and credits (or their equivalent) will not be considered eligible.

* For admission to the program in August 1986 only, an alternate to the English course will be accepted. The alternate course must be UBC 3 credit course (or equivalent). The English prerequisite is waived for entry in 1986 only. All applicants must be completely competent in both written and oral English. The applicant's fluency in English will be assessed at a personal interview.

** No specific Mathematics courses are recommended. However, a total of 3 UBC credits at the Math 100 level (or its equivalent) are required. Calculus or Statistics courses are acceptable. Applicants should be aware that, in the event that their application to Medical Laboratory is not successful, Calculus courses are required for entry into most second year university science programs.

Medical Radiography — Algebra 12, two science 11s (Physics 11 preferable) and one science 12. C+ in the final year of secondary school is required.

Nuclear Medicine Technology — Algebra 12, Chemistry 11 and 12, and one other Science 11 (Physics 11 desirable).

Occupational Health and Safety — Algebra 12, Chemistry 11 and Physics 11.

Prosthetics and Orthotics — Algebra 12 and Physics 11. Course in metalwork and woodwork are recommended. Note that this program offers an entry once every two years only. The next session begins September, 1986.

Note: Please refer to page 10 of the Admissions section, if you wish to be considered under the Mature Student category.

Important

Where an algebra course requirement is specified in Engineering Technology Studies and Health Sciences Studies, please note that Academic Math 12 completed before 1978 is an acceptable prerequisite.

SEE PROGRAM DESCRIPTION PAGES FOR INDIVIDUAL PROGRAM NON-ACADEMIC PREREQUISITES.

Basic Training for Skills Development Upgrading — Level 4

Experience has indicated that those students who have taken the five months upgrading course could not successfully compete with those students who have an academic level of achievement in engineering, health and certain management technologies. The mathematics and sciences which BCIT students are required to assimilate are too difficult for those who have had such limited exposure to these subjects. Students who have taken the upgrading course are still required to have Grade 12 level special technology prerequisites.

General Educational Development Tests

These tests are designed for people who have not completed high school graduation but who, because of experience, have presumably reached a level of general development equivalent to high school graduation. Unfortunately, whatever general development a person may have accomplished, mathematical and science ability and knowledge may not necessarily have been strengthened.

Therefore, success in the General Educational Development Tests is considered to be equivalent to BCIT general prerequisites; that is, graduation from a senior secondary school. Applicants who are successful in these tests are required to achieve satisfactory standings in the special prerequisites specified by the technology they have applied to.

How to Make up Course Deficiencies

Preparatory programs are available through the School of Academic and Vocational Studies for those students who lack specific prerequisites or desire refresher courses. For information, please contact Program Information at 434-1610.

How to Apply

Applications for admission to a program should be submitted as early as possible, as some programs at BCIT have a limited number of seats available. Application forms and additional information may be obtained from the Office of the Registrar, BCIT, 3700 Willingdon Avenue, Burnaby, B.C. V5G 3H2, phone 434-1610. These forms should be completed and returned with the necessary **official** documents attached. See Document Requirements.

When to Apply — Full-Time Programs

Applications for admission into full-time programs are accepted for processing from the dates shown below to 14 days after the commencement of classes.

Term Starting	Processing Date
May 1986 Electrical/Electronics	August 1, 1985
September 1986 All Programs including August Nursing and Medical Laboratory	January 2, 1986
January 1987 Computer Systems Financial Management Marketing Management Electrical/Electronics General Nursing	June 2, 1986

May 1987 Electrical	August 1, 1986
September 1987 All programs including August Nursing and Medical Laboratory	January 2, 1987

Applicant Status Categories

Candidates making application to BCIT will receive correspondence informing them of their status according to the following guidelines:

Acceptance — The applicant who meets the requirements of the Institute and the program may be fully accepted.

Provisional Acceptance — A decision to accept provisionally is based upon the initial information submitted by the applicant. Full acceptance is dependent on final data submitted and applicability to criteria.

Wait Lists — When all seats in a program are filled, a wait list of qualified applicants is generated. If a space becomes available, an applicant on the wait list will be given the seat. Waitlists are not transferred to following sessions. We encourage applicants to contact Admissions who may suggest other similar programs in which seats are available.

Non-Acceptance — The applicant does not meet the requirements of the Institute and/or the program.

Final acceptance or non-acceptance by BCIT is based on the decision of the Registrar. BCIT reserves the right to accept only those applicants who appear to have the capabilities necessary to succeed in the chosen programs.

Acceptance is non-transferable from term to term.

Document Requirements

The following official documents must accompany the completed application form. **Photocopies are not acceptable.**

1. A senior secondary school transcript showing graduation. Applicants who are presently attending high school must submit a statement of marks of grade 11 subjects, and first semester grade 12 marks from the principal's office. A statement showing courses currently attending is also required. All marks must be substantiated by a final secondary school transcript incorporating school marks and provincial exam marks.

2. If applicable, all official post-secondary school statements of marks indicating credits and grades achieved.

3. Applicants who are not Canadian citizens must submit official government documents indicating Landed Immigrant Status or Student Authorization. Transcripts and all other related academic documents must be translated into English and notarized at the applicant's expense.

4. School of Health Sciences applicants are required to complete a medical questionnaire and return it to the Medical Services Department at BCIT. Some health technologies require students to present evidence of having had a recent chest x-ray as well as having completed an immunization program. You will be notified if this information is required from you. If, due to extenuating circumstances, supporting documentation is not available at the time, students will be required to complete the necessary procedures at Medical Services, at BCIT.

5. Students who have been selected for admission must have medical insurance coverage prior to registration.

   Non-Canadian students who have been selected for admission must apply in person to the Medical Services Department, for an Application for Student Medical and Hospital Plan, prior to attending BCIT. Payment for this medical coverage is to be made at the same time, either by personal cheque or money order, to the vendor of the policy. Proof of coverage will be required.

6. Applicants who voluntarialy withdrew or were withdrawn from another Institute may be requested by the teaching department to provide a written report explaining the reason and/or written authorization to request a report from the previous Institute. These documents can be used to determine acceptance to the desired program.

   Note: Whether or not a person is accepted for admission, academic documents are not returned. Applications and documents are not maintained by the Institute for those applicants who are accepted and are unable to enrol, or for those candidates who have not been accepted. If making re-application to BCIT, a new application must be completed and all supporting documents must be resubmitted.

Course Credit, Course Exemption and Advanced Standing

Course exemption may be granted for courses taken previously at BCIT.

Course credit may be granted for individual subjects taken at BCIT or other recognized post-secondary institutions, when the course is equivalent in content to the course for which credit is sought.

Guidelines

a) First year students may only apply for course credit/exemption after they have been fully accepted and paid their commitment/term fees.

b) Second and third year students, who are direct entrants to BCIT, may apply for course credit/exemption upon receiving full acceptance.

c) Students who are presently enrolled at BCIT may apply for course credit/exemption at any time within the specified schedule.

Course credit/exemption may be applied for each term or on an academic year basis. Applications for the next term will be processed approximately half way through the current term.

Course credit/exemption is granted or denied by the Registrar upon recommendation by the technology department head and/or the teaching department head.

If course credit/exemption is granted and not replaced with an approved course of equal duration, you will not be eligible for BCIT scholarships. However, if you are registered in courses for which the weekly hours total at least 60% of the weekly hours for the full program, you may apply for a B.C. Student Loan or Canada Student Loan. In order to be eligible to receive an HONORS diploma or GRADUATING AWARD, SECOND YEAR students who receive course credit/exemption or advanced standing in one or more subjects must register in a substitute course approved for this purpose by the department head.

Applications for course credit/exemption must be submitted to the Office of the Registrar no later than 14 calendar days after the commencement of classes each term. Late applications will only be accepted if prior written authorization has been received by the Registrar from the technology department head.

Change of Program

After the commencement of classes, a request for program transfer requires the completion of a Program Change form by the student. It is the responsibility of the student to obtain approval and signatures from the appropriate Department Head, Dean and Registrar. Permission must be granted by the Registrar before a change in program can be affected.

Course Credit

A credit is defined as approximately one classroom hour per week over a 12–20 week term. Therefore, a course taught for three hours per week for 12 weeks would normally be assigned three credits.

It is recognized that in assigning credits to courses, other criteria are also considered, such as:

—course content
—learning outcomes
—whether it is a lab (clinical or practicum)

Certificates and Diplomas

Although BCIT has recently changed over from a system of **units** to the **credit** system as defined above, we are still in the process of reviewing our certificates and diploma requirements in terms of number of credits.

Transfer from Full-time Studies to Part-time Studies

A student transferring to part-time studies from a full-time diploma program will generally be granted credit exemption for all courses successfully completed prior to withdrawal from full-time studies. A student who fails one or more subjects in the full-time program is encouraged to consider part-time studies programs before withdrawal from full-time studies.

Examinations, Grading and Marks

Formal examinations are written at the end of each term. Students are required to take the examinations for each course at the time set by the Institute. Students unable to write examinations due to special circumstances should first contact their instructor; then, if necessary, consult the Department Head.

External Examinations — Part-time Studies only

We will attempt to co-operate with any **part-time** student who cannot write an examination because of absence from the city, by allowing the student to write the examination at a set time in another centre under an invigilator acceptable to the Institute.

Return of Examinations

For full-time students, mid-term and Christmas examination papers may be returned to students ten school days after the official institute distribution schedule for the Statement of Marks. Only those examinations designated as "restricted exams" by the Dean shall not be returned.

Part-time students wishing to have their examination papers returned should make arrangements with their course instructor.

Determination of Standing

Final standing is determined on the basis of term progress and examination results. Full-time students subject standings are reviewed by a Divisional Marks Review Committee where final standing is determined. Subject standing is as follows:

1—First class..... 80% or more
2—Second class..... 65% to 79%
3—Pass..... 50% to 64%
4—Failure..... less than 50% or unapproved/unofficial withdrawal from subject or program.

When an "F" appears beside a course it indicates one of the following:

1. Failure in the subject
2. Withdrawal after the deadline (refer to section on Withdrawal from Program Courses.)
   A full-time student whose transcript bears such a standing is generally not permitted to proceed to the next term unless granted special permission by letter from the Registrar, after approval by the Divisional Marks Review Committee.

A Aegrotat — A pass standing based on term marks.
CH Challenge Credit — Challenge exam written for the course.
C Course Credit Granted — Recognition of approved equivalent studies and/or experience.
EC Exempt Course — Recognition of previous course completion at BCIT.
PP Provisional Pass — Will be changed to Pass or Fail depending on performance in a subsequent specific course.
P Provisional Pass Fulfilled — Provisional Pass conditions achieved.
AP Adjudicated Pass — Standing based on overall performance in the term.
N Not Complete — Course requirements not completed.
X No examination or grade given for this course.
S Satisfactory — Course requirements fulfilled, no mark assigned.
U Unsatisfactory — Course requirements not fulfilled, no mark assigned.
AU Audit — Attended course, no credit assigned.
W Withdrawal — Approved withdrawal from a course or program.

Withdrawal from Program Courses

A full-time student withdrawing from one or more courses without permission will receive an "F" on his/her transcript. Withdrawal **with** permission from his/her Department Head or Dean and **within** withdrawal deadlines will show a "W" on the transcript. Appeals to the Registrar will be adjudicated by the Registrar and the Dean. It is the student's responsibility to check withdrawal deadlines.

A full-time student withdrawing officially from the whole program, will be allowed to do so until two-thirds of the way through the term and a "W" will show on the transcript. If withdrawing after the deadline, the transcript will show "F" for all courses dropped.

A part-time student cannot withdraw after two-thirds of the term cut-off date without having an "F" on his/her transcript for the courses dropped.

Distribution of Marks

Students will not be provided with marks prior to the issuance of a Statement of Marks by the Registrar's Office. Marks will not be released over the telephone.

Marks, including the result of December examinations, will be mailed to students by the Office of the Registrar. **Note:** A full-time student who has failed a term ending in December (also April and August for Computer Systems, Financial Management, Marketing Management and Electrical) will be advised by telegram prior to the commencement of the next term. A letter indicating the student's status, and the student's Statement of Marks follows the telegram.

Transcripts resulting from final examinations are mailed to graduating students by the Office of the Registrar. All other students will receive a Statement of Marks for the term.

Additional Transcripts

A fee of $4 for the first copy and $1 for each additional copy is charged for transcripts. The fee is due at the time the request is made.

Withholding Statement of Marks

No Statement of Marks, transcript, diploma or certificate will be issued until the student has cleared up all financial and other obligations to the Institute such as tuition fees, library fines, rent. These documents may also be withheld on such other grounds as the Board of Governors may from time to time direct.

Marks Reassessments

It is the policy of the Institute that students shall be dealt with fairly in all decisions affecting their academic standing. A student who is not satisfied with the final mark award is cautioned that the grade has been reviewed carefully and, aside from clerical error, reassessments seldom result in a higher mark.

A student wishing a reassessment of his/her academic standing must first discuss the matter with the instructor responsible for the initial assessment and, if dissatisfied with the result of that discussion, with the Teaching Department Head.

Failing a resolution of the problem, the student may then submit a Request for Reassessment on the Institute form available from the Office of the Registrar. **ALL PARTS OF THE FORM MUST BE COMPLETED AND MUST REACH THE REGISTRAR'S OFFICE WITHIN 7 SCHOOL DAYS AFTER THE START OF CLASSES IN THE NEXT TERM, OR WITHIN 30 CALENDAR DAYS AFTER THE MAILING OF MARKS FROM THE INSTITUTE, WHICHEVER IS LESS.**

There is a fee of $25 for each subject reassessed. If the mark or standing is favorably adjusted, the fee will be refunded.

The Registrar will inform the student by letter of the result of the reassessment.

Marks Appeals

A student who is dissatisfied with the outcome of a reassessment may appeal the decision to the President.

The student must first discuss the problem with the Dean of the appropriate School. The Dean must provide the Registrar with a written statement confirming the outcome of the discussion.

If the student then decides to proceed with the appeal, the student must complete and sign a Request to Appeal form and submit it to the Registrar's Office, along with the $25 fee, WITHIN TWO WEEKS OF THE MAILING OF THE REASSESSMENT RESULT TO THE STUDENT.

An Appeal Committee will be formed to deal with the Appeal according to procedures approved by the Education Council for that purpose.

The President will inform the student by letter, of the result of the appeal.

Note: A student who has been permitted to audit classes during the reassessment may continue to do so during the appeal.

Auditing

A student may audit a course with the permission of the instructor. An audit student is not formally evaluated and does not write examinations. However, the student is expected to take an active part in classroom discussions and laboratory exercises, maintain satisfactory attendance and pay the full course fee.

An auditing student does not receive credit for the course, but will receive a Statement of Marks with "Audit" indicated. A student may change his status in the course from audit to credit, with written permission of the instructor during the course, but will not receive credit by applying after the course is completed.

Attendance

Full-time Studies — (see Conduct and Attendance page v).

Part-time Studies — Students are required to attend at least 50% of the scheduled classes and laboratory sessions. Failure to meet the attendance requirement will result in a grade of "N" — not complete.

Failures and Repetition

A student who fails more than one subject in a term may be permitted to repeat the term only at the discretion of the program Dean and the Registrar (see Readmissions procedure under Admissions). It is the responsibility of the student who has failed one or more subjects, but is permitted to continue with his/her program or studies, to present evidence of successful completion of the failed subject(s) to the Office of the Registrar prior to the end of the next term or before a Diploma of Technology is awarded, whichever condition is specified at the time or subsequent to the failure.

Student Research Reports

Some BCIT students are required to research and write reports, with the guidance of faculty and staff, as part of their course work. Unless otherwise specified by the instructor, these reports are assigned as educational exercises only. The student, not BCIT, is ultimately responsible for the content of such a report.

Diplomas

Diploma of Technology

Graduates of the British Columbia Institute of Technology will be awarded a nationally recognized Diploma of Technology at the convocation exercises. Graduates unable to attend the convocation exercises will have their diplomas sent by registered mail to their current address on file with the Institute.

Honors Diploma

An Honors Diploma is awarded to a graduating student whose average marks for all courses that constitute an approved second year program of studies is 80% or greater.

Students who have been granted course credit exemption or advanced standing for second year courses while in attendance at BCIT, will not be eligible for Honors Diploma status, unless approved courses are added to maintain 100% workload. The Office of the Registrar must be notified by the Department Head of approved substitute courses.

Double Diploma

After receiving a Diploma of Technology in any field of study from BCIT, a graduate may earn a second diploma in another area of study upon the successful completion of one full year or its equivalent. Each program will be developed in consultation with the student's department head, giving special recognition to the student's individual needs. Each program leading to a Double Diploma must be approved by the Technology Department Head and the Registrar. Application forms may be obtained from the Office of the Registrar.

Replacement Diploma

Only one diploma will be issued to each student. Should a student request a copy because of loss a "Request for a Replacement Diploma" form must be completed and returned to the Office of the Registrar. Upon review of the reason for the loss, the Registrar may issue a replacement diploma. There is a $10 charge for issuing a replacement diploma.

Certificates and Certificate of Technology

See Part-time Technology Admissions information.

Graduating Awards

Honor Awards

The following Honor Awards are presented at convocation.

The ***Governor General's Silver Medal*** is presented to the top academic student in a Technology Diploma Program. Graduates from the previous August Nuclear Medicine class are also considered, as are August and December graduates from the Electrical/Electronics Technology and December graduates from Nursing.

The ***Lieutenant Governor's Silver Medals*** are awarded for academic excellence and contribution to both Institute and the community at large. Two are presented each year, one to a Trades program graduate and the second to a graduate of a Certificate Program. (Subject to the approval of the Lieutenant Governor's Office).

The ***Board of Governors' Citizenship Award*** is presented to the graduating student who has a record of active participation in a student activities, a reputation for mature personal relations with both staff and students, and reasonable academic standing.

The ***President's Award*** is presented to the most outstanding academic student in each of the four Schools — Computer and Electro-Mechanical Studies, Construction and Natural Resource Studies, Health Sciences Studies and Management Studies.

Academic Awards

Academic Awards, are presented annually to students who achieve the highest academic standing in their programs of studies. The following awards were presented at the June 1985 Graduating Awards Ceremony.

School of Computing and Electro-Mechanical Studies

CAD/CAM
The CAD/CAM Award

Computer Systems
The Computer Systems Award in Information Systems
The Computer Systems Award in Management Systems
The Computer Systems Award in Microcomputer Systems
The Computer Systems Award in Expert Systems
The Computer Systems Award in Engineering Systems

Electrical/Electronics
The Microtel Pacific Research Award in Telecommunications
The Federal Pioneer Award in Power
The Instrument Society of America Award in Instrumentation
The MacDonald, Dettwiler and Associates Limited Award in Control Electronics

Mechanical
The Canadian Manufacturers' Association Award in Production
The Canadian Society for Mechanical Engineering Award in Design
The Mechanical Contractors Association of B.C. Award in Mechanical Systems

School of Construction and Natural Resource Studies

Biological Sciences
The B.C. Federation of Agriculture R.B. Stocks Award in Agri-Management
The B.C. Nursery Trades Association Award in Landscape Horticulture
The Canadian Agricultural Chemical Association, B.C. Section Award in Food Production
The Fisheries Association of B.C. Award in Food Processing

Building
The Architectural Institute of British Columbia Award in Architecture
The Building Award in Economics
The Building Award in Mechanical Systems

Civil and Structural
The Swan Wooster Engineering Company Limited, Col. W.G. Swan Award

Surveying
The BCLS — George New Compass Award

Lumber and Plywood
The Council of Forest Industries Award

Mining
The Canadian Institute of Mining and Metallurgy, Vancouver Branch Award

Natural Gas and Petroleum
The Westcoast Transmission Company Ltd. Award

Chemical Sciences
The Canadian Institute of Mining and Metallurgy, Vancouver Branch Award in Extractive Metallurgy
The Canadian Pulp and Paper Association, Technical Section, Pacific Coast and Western Branches Award in Pulp and Paper
The Canadian Society for Chemical Technology Award in Organic Chemistry
The Chemical Sciences Award in Pollution Sciences
The Chemical Sciences Award in Physical Metallurgy

School of Health Sciences Studies

Biomedical Electronics
The Biomedical Electronics Graduation Award
The Electrophysiology Graduating Award

Health Information
The Health Record Association of B.C. Award in the Health Record Administrator Program
The Health Record Association of B.C. Award in the Health Record Technician Program

Medical Laboratory
The B.C. Society of Medical Technologists Award

Medical Radiography
The B.C. Radiological Society Award

Nuclear Medicine Technology
The Frosst Radiopharmaceutical Division, Ralph Jamieson Award

Occupational Health and Safety
The Occupational Health and Safety Award

General Nursing
The W.B. Saunders Co. Canada Ltd. Award

Psychiatric Nursing
The Registered Psychiatric Nurses Association of B.C., Richard Strong Memorial Award

School of Management Studies

Administrative Management Systems
The Bank of British Columbia Award in Administrative Systems
The Finning Tractor and Equipment Co. Ltd. Award in Personnel and Industrial Relations
The Business Administration Award

Broadcast Communications
The British Columbia Association of Broadcasters Award

Financial Management
The Canadian Life and Health Insurance Association Award
The Society of Management Accountants of British Columbia Award in Accounting
The Royal Bank Finance Award

Hospitality and Tourism Administration
The British Columbia Hotels' Association Award in Hotel, Motel and Food Service
The Ryan Schlyecher Memorial Award in Travel and Tourism

Marketing Management
The Bank of British Columbia Award in International Business
The Real Estate Council of British Columbia Award in Real Estate
The Vancouver Sun Award in Technical Sales and Marketing
The Canadian Tire Award in Advertising and Sales Promotion

Operations Management
The Vancouver Transportation Club Award in Transportation and Distribution

Achievement Awards

School of Construction and Natural Resource Studies

Biological Sciences
The B.C. Food Technologists Award in Food Processing

Building
The Clay Brick Association Award
The P.B. Ford and Company Award
The Royal Institution of Chartered Surveyors, B.C. Group Award
The Quantity Surveyors Society of B.C. Awards
The Isabel Verner Memorial Book Prize
Construction Specifications Canada, Vancouver Chapter Award

Civil and Structural
The Dillingham Construction Ltd. Award
The Dominion Construction Awards
The Wright Engineers Ltd. Award
The Associated Engineering Services Ltd. Award
The Society of Engineering Technologists of the Province of B.C., Presidents' Award of Excellence

Surveying
The Dillingham Construction Ltd. Award
The Canadian Institute of Surveying Membership Award

Lumber and Plywood
The Ralph S. Plant Ltd. Award

Chemical Sciences
The Canadian Pulp and Paper Association, Technical Section, Pacific Coast and Western Branches Award in Pulp and Paper
BCIT Mathematics Department Book Prize
The Can Test Limited Awards

School of Computing and Electro-Mechanical Studies

Mechanical
The Institution of Mechanical Engineers, Western Canada Branch, Commander S.M. Terry Memorial Award
H.A. Simons (International) Ltd. Award
The Wright Engineers Ltd. Award

School of Health Sciences Studies

Biomedical Electronics
The Graphic Controls Canada Ltd. Award

Medical Laboratory
The Coulter Electronics Canada Awards in Hematology
The Metropolitan Clinical Laboratories Ltd. Award in Biochemistry
The Metropolitan Clinical Laboratories Ltd. Award in Microbiology
The Ortho Diagnostics Award in Immunohematology
The Sherwood Medical Industries Inc., Paraplast Award in Histology
The General Diagnostics Awards for General Proficiency

Nuclear Medicine Technology
The Metropolitan Clinical Laboratories Ltd. Award for Clinical Excellence

General Nursing
The Department Head's Prize for Excellence in Bedside Nursing

Psychiatric Nursing
The Psychiatric Nursing Department Service Award

Prosthetics and Orthotics
The School of Health Sciences Prize

School of Management Studies

Administrative Management Systems
The Westcoast Transmission Company Ltd. Awards
The Administrative Management Systems Students' Award
The London Drugs Ltd. Award

Broadcast Communications
The British Columbia Film Industry Association, Jack Gettles Memorial Award for Creativity in Television
The Broadcast Communications Commercial Production Award of Excellence
The Broadcast Communications Commercial Production Award, Honorable Mention
The Rogers Cable T.V. — Vancouver Award of Excellence in Broadcast Engineering
The Canadian Broadcasting Corporation Award in Television

Financial Management
The Certified General Accountants of B.C. Awards
The Financial Executives Institute, Vancouver Chapter Award
The Society of Management Accountants of B.C. Award
The Institute of Chartered Accountants of B.C. Award
The Vancouver Stock Exchange Award

Hospitality and Tourism Administration
The Columbia Association of Hospitality Accountants Award in Accounting
The Hotel Vancouver Award in Hotel, Motel and Food Service
The Sunsational Vacations Limited Award in Travel and Tourism
The White Spot Ltd. Awards in Hotel, Motel and Food Service

Marketing Management
The Block Bros. Industries Ltd. Award in Real Estate Management

Operations Management
The Canadian Association for Production and Inventory Control, Vancouver Chapter Awards
The Operations Management Award

Fees and Expenses

Full-Time Tuition Fees Policy for Academic Year 1986/87

Tuition expenses are reviewed annually and have been established by the Board of Governors of the British Columbia Institute of Technology and approved by the Ministry of Education for the academic year 1986/87 and are subject to change each academic year.

1. A non-refundable commitment fee of $75.00 is due upon the applicant's acceptance into first level, including Double Diploma programs. This fee is applied toward the tuition fees and is not transferable to part-time courses.
2. An accepted applicant whose commitment fee has not been paid by the due date stated on the letter of acceptance will forfeit the seat which has been reserved.
3. An accepted applicant is required to pay the remainder of first level fees 60 days before the commencement of classes.
4. An applicant accepted less than 60 days before the commencement of classes is required to pay tuition fees upon acceptance.
5. Double Diploma Program students pay according to Two-level Programs.
6. After the commencement of classes, a student whose fees are outstanding will be excluded from classes and have his/her registration cancelled. An additional $50.00 fee will be levied for reinstatement into classes.
7. Part-time day courses are assessed $54.00 per credit to a maximum tuition fee of $680.00 per level.
8. **Second Year Students** — A student returning to begin the second year of a two-year program is required to pay full term fees 30 days before the commencement of classes.

Payment made by cheques and money orders should be made payable to the BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY or BCIT. Payment may also be made by VISA or MASTERCARD. A charge of $15.00 will be levied for costs in handling cheques returned for non-sufficient funds or other reasons. Please include your SOCIAL INSURANCE NUMBER with your payment.

International Students

Fees for international students on student authorizations are based on full cost recovery, and subject to approval by the Provincial Government. Based on the 1985-86 fee structure, the minimum tuition fee rate for international students for 1986-87 will be $6,800 per academic year.

Miscellaneous Fees

The following fees have been approved by the BCIT Board of Governors.

Annual Fees

Tuition fees and all related policies have been reviewed for the 1986/1987 year by the British Columbia Institute of Technology Board of Governors and may be subject to change.

	1st Year	2nd & 3rd Year
General Tuition	$1,360	$1,360
Student Activity (annual)	75	75
Convocation (mandatory)		15
Total	$1,435	$1,450

First Year Students 1986/87

All first year students must pay their fees according to the following schedule:

First Level (term) — *due 60 days before commencement of classes*

General tuition (includes $75 non refundable commitment fee)	$680
Student activity fee	38
	$718

Second Level (term) — due first week of classes

General tuition	$680
Student Activity	37
	$717

Second and third year students 1986/87

All second and third year students must pay their fees according to the following schedule:

Third Level (term) — due 30 days before commencement of classes

General tuition	$680
Student activity	38
	$718

Fourth Level (term) — due first week of classes

General tuition	$680
Student activity	37
Graduation fee	15
	$732

Summer term only — The student activity fee is $22.00 for all levels.

General Nursing

All students must pay according to the fee schedule previously stated for the School of Health Sciences.

Note: The only exception is Level 5.

Level 5 — due first week of classes.

General Tuition	$680
Student Activity	15
	$695

Two-level Programs 1986/87

Health Record Technician and Double Diploma Programs

Level 1 — due 60 days prior to the commencement of classes

General Tuition (includes $75 non-refundable commitment fee)	$680
Student Activity	38
	$718

Level 2 — due first week of classes

General Tuition	$680
Student Activity	37
Graduation	15
	$732

Electrical/Electronics Technology 1986/87

All students must pay according to the fee schedule previously stated for the School of Engineering Technology.

Note: The only exceptions are: Co-op Program Level 4 and Level 5.

Co-op Program — due first week of classes.

General Tuition	$340
Student Activity	15
	$355

Level 4 — due first week of classes

General Tuition	$680
Student Activity	38
	$718

Level 5 — due first week of classes

General Tuition	$680
Student Activity	37
Graduation Fee (mandatory)	15
	$732

Effective April 1, 1986

NSF Cheques	$15.00
Transcript of Marks	$ 4.00 for first copy and $1.00 for each additional copy
Duplicate of Diploma	$10.00 per copy
Reassessment or Appeal of Exam	$25.00 per subject
Duplicate Tax Receipts	$10.00

Effective 1986/87 Academic Year

Graduation Fee	$15.00
Challenge Exam Fee	$75.00
Reinstatement Fee	$50.00

Withdrawal and Refund Procedure

How to Withdraw

Students who wish to withdraw officially from BCIT must commence the process by first reporting to the Counselling Centre.

Students who are asked to withdraw from a course for reasons of discipline or unsatisfactory progress may forfeit any right to a refund under this section.

Refunds — Subject to Change for 1987/88

Refunds of fees for first level students who withdraw up to 14 days after the commencement of classes:

General Tuition: Complete refund, less $75 commitment fee.

Student Activity: Complete refund.

Refunds of fees for students (other than first level students) who withdraw up to 14 days after the commencement of classes:

General Tuition: Complete refund.

Student Activity: Complete refund.

Refunds of fees for students who withdraw 14 days after the commencement of classes:

General Tuition: No refund.

Student Activity: Appropriate student activity fee refunds will be issued by the Institute up to the last day of withdrawal refund.

After the last day of February, any student activity fee refunds must be claimed in writing from the BCIT Student Association Office and the student's ID card(s) turned in on receipt of the refund. Withdrawal verification will be made by the BCIT Student Association before processing the claim.

Important Dates 1986/87

Schools of Computing and Electro-Mechanical Studies, Construction and Natural Resource Studies, Health Sciences Studies, Management Studies and Academic and Vocational Studies.

See subsequent pages for Electrical Technology, General Nursing, Medical Laboratory and Diagnostic Medical Sonography.

1986

Jul 1 — CANADA DAY
Jul 4 — Term Fee Deadline for Level 1 registering Sep 2
Jul 25 — Last day to withdraw from Level 2 Financial Mgmt, Computer Systems and Marketing Mgmt in order to receive "W" on transcript

Aug 1 — Term Fee Deadline for Level 3 registering Sep 2
Aug 4 — B.C. Day
Aug 8 — Term Fee Deadline for Level 3 Hospitality and Tourism registering Sep 8
Aug 18 -22 — Examinations for Level 2 Financial Mgmt, Computer Systems, and Marketing Mgmt
Aug 25 -29 — Medical Radiography Level 1 Hospital Orientation

Sep 1 — LABOR DAY
Sep 2 — Level 1 and 3 Registration
Sep 3 — Level 1 and 3 classes begin
Sep 8 — Hospitality and Tourism Level 3 Registration and classes begin
Sep 16 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee for Level 1)
Sep 16 — Last day to apply for Course Credit/Exemption
Sep 21 — Last day to withdraw from Level 3 Hospitality and Tourism in order to receive full refund

TBA — SHINERAMA
Oct 13 — THANKSGIVING

Nov 3 — Term Fee Deadline for Level 1 Financial Mgmt, Computer Systems and Marketing Mgmt
Nov 7 — Last day to withdraw in order to receive "W" on transcript
Nov 11 — REMEMBRANCE DAY

Dec 8 -12 — Examinations Levels 1 and 3
Dec 15 -Jan 1 — CHRISTMAS BREAK

1987

Jan 2 — Level 1 Registration for Financial Mgmt, Computer Systems and Marketing Mgmt
Jan 5 — Levels 2 and 4 classes begin
Jan 5 — Level 1 classes begin for Financial Mgmt, Computer Systems and Marketing Mgmt
Jan 9 — Term Fee Deadline for Levels 2 and 4
Jan 19 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee for Level 1)
Jan 19 — Last day to apply for Course Credit/Exemption

TBA — SPRING BREAK

Apr 3 — Last day to withdraw in order to receive "W" on transcript
Apr 17 — GOOD FRIDAY
Apr 20 — EASTER MONDAY

May 18 -22 — Examinations Levels 1, 2 and 4
May 25 — VICTORIA DAY (may be changed by Order-in-Council)

Jun 1 — Level 2 classes begin for Financial Mgmt, Computer Systems and Marketing Mgmt
Jun 5 — Term Fee Deadline for Level 2
TBA — CONVOCATION

Electrical Technology

1986

Jul 1 — CANADA DAY
Jul 4 — Term Fee Deadline for Level 1 registering Sep 2

Aug 1 — Term Fee Deadline for Level 3 registering Sep 2
Aug 4 — B.C. Day

Sep 1 — LABOR DAY
Sep 2 — Registration for all Levels; CO-OP 1 and 2 begins
Sep 3 — Classes begin for all Levels
Sep 5 — Term Fee Deadline for Levels 2, 4, 5 and CO-OP 1 and 2
Sep 16 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee for Level 1)
Sep 16 — Last day to apply for Course Credit/Exemption

TBA — SHINERAMA
Oct 13 — THANKSGIVING

Nov 3 — Term Fee Deadline for Level 1 registering Jan 2/87
Nov 7 — Last day to withdraw in order to receive "W" on transcript
Nov 11 — REMEMBRANCE DAY

Dec 3 — Term Fee Deadline for Level 3 registering Jan 2/87
Dec 8 -12 — Examinations all Levels
Dec 15 -Jan 1 — CHRISTMAS BREAK

1987

Jan 2 — Registration for all Levels; CO-OP 1 and 2 begin
Jan 5 — Classes begin for all Levels
Jan 9 — Term Fee Deadline for Levels 2, 4, 5, and CO-OP 1 and 2
Jan 19 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee for Level 1)
Jan 19 — Last day to apply for Course Credit/Exemption

Mar 4 — Term Fee Deadline for Level 1 registering May 4
Mar 13 — Last day to withdraw in order to receive "W" on transcript

Apr 3 — Term Fee Deadline for Level 3 registering May 4
Apr 13 -16 — Examinations for all Levels
Apr 17 — GOOD FRIDAY
Apr 20 — EASTER MONDAY

May 4 — Registration for all Levels; CO-OP 1 and 2 begins
May 5 — Classes begin for all Levels
May 8 — Term Fee Deadline for Levels 2, 4, 5 and CO-OP 1 and 2

May 15 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee for Level 1)
May 15 — Last day to apply for course credit/exemption
May 25 — VICTORIA DAY (may be changed by Order-in-Council)

TBA — CONVOCATION

Jul 1 — CANADA DAY
Jul 10 — Last day to withdraw in order to receive "W" on transcript

Aug 3 — B.C. DAY
Aug 10 -14 — Examinations for all Levels

General Nursing

1986

Jun 18 — Term Fee Deadline for Level 1 registering Aug 14

Jul 1 — CANADA DAY
Jul 18 — Term Fee Deadline for Level 3 registering Aug 18

Aug 4 — B.C. DAY
Aug 14 and 15 — Term 1 Registration and Orientation

Aug 18 — Terms 3 and 5 Registration; all Term classes begin
Aug 22 — Terms Fee Deadline for Terms 2, 4 and 5

Sep 1 — LABOR DAY
Sep 2 — Last day to withdraw in order to receive a full refund (less $75 Commitment Fee for Term 1)
Sep 2 — Last day to apply for Course Credit/Exemption

TBA — SHINERAMA

Oct 13 — THANKSGIVING
Oct 31 — Last day to withdraw in order to receive "W" on transcript

Nov 3 — Term Fee Deadline for Term 1 registering Jan 2/87
Nov 11 — REMEMBRANCE DAY

Dec 5 — Term Fee Deadline for Term 3 registering Jan 2/87
Dec 8 -12 — Examinations for all Terms

Dec 15 -Jan 1 — CHRISTMAS BREAK

1987

Jan 2 — Term 1 Registration and Orientation
Jan 5 — Term 3 and 5 Registration; all Term classes begin
Jan 9 — Term Fee Deadline for Terms 2, 4 and 5
TBA — CONVOCATION
Jan 19 — Last day to withdraw in order to receive a full refund (less $75 Commitment Fee for Term 1)
Jan 19 — Last day to apply for Course Credit/Exemption

TBA — SPRING BREAK

Mar 21 — Last day to withdraw in order to receive "W" on transcript

Apr 17 — GOOD FRIDAY
Apr 20 — EASTER MONDAY

May 4 -8 — Examinations for all Terms
May 25 — VICTORIA DAY (may be changed by Order-in-Council)

TBA — CONVOCATION

Medical Laboratory Technology

1986

Jun 6 — Term Fee Deadline for Level 1 registering Aug 5

Jul 1 — CANADA DAY

Aug 4 — B.C. DAY
Aug 5 — Level 1 Registration
Aug 6 — Level 1 Classes begin
Aug 19 — Last day to withdraw in order to receive a full refund (less $75 Commitment Fee)
Aug 19 — Last day to apply for Course Credit/Exemption

Sep 1 — LABOR DAY

TBA — SHINERAMA

Oct 13 — THANKSGIVING
Oct 24 — Last day to withdraw in order to receive "W" on transcript

Nov 11 — REMEMBRANCE DAY

Dec 15 -16 — Examinations
Dec 17 -Jan 1 — CHRISTMAS BREAK

1987

Jan 5 — Level 2 Classes begin
Jan 9 — Term Fee Deadline for Level 2
Jan 19 — Last day to withdraw in order to receive a full refund
Jan 19 — Last day to apply for Course Credit/Exemption

TBA — SPRING BREAK

Apr 3 — Last day to withdraw in order to receive "W" on transcript
Apr 17 — GOOD FRIDAY
Apr 20 — EASTER MONDAY

May 25 — VICTORIA DAY (may be changed by Order-in-Council)
May 26 -27 — Examinations

Diagnostic Medical Sonography

1986

Jul 1 — CANADA DAY
Jul 4 — Term Fee Deadline for Level 1 registering Sep 2

Aug 4 — B.C. DAY

Sep 1 — LABOR DAY
Sep 2 — Level 1 Registration
Sep 3 — Level 1 Classes begin
Sep 16 — Last day to withdraw in order to receive full refund (less $75 Commitment Fee)
Sep 16 — Last day to apply for Course Credit/Exemption

TBA — SHINERAMA

Oct 13 — THANKSGIVING

Nov 7 — Last day to withdraw in order to receive "W" on transcript

Nov 11 — REMEMBRANCE DAY

Dec 8 -12 — Examinations

Dec 15 -Jan 2 — CHRISTMAS BREAK

1987

Jan 5 — Level 2 Clinical Phase begins

Jan 9 — Term Fee Deadline for Level 2

Jan 19 — Last day to withdraw in order to receive a full refund

Jan 19 — Last day to apply for Course Credit/Exemption

Apr 17 — GOOD FRIDAY

Apr 20 — EASTER MONDAY

May 25 — VICTORIA DAY (may be changed by Order-in-Council)

Jun 5 — Last day to withdraw in order to receive "W" on transcript

Jul 1 — CANADA DAY

Aug 3 — B.C. DAY

Aug 17 -21 — Examinations

Note: There is no summer break for this program.

Diploma Programs

Natural Resource Studies

Building

Spiralling advances in technology have increased the public's expectation of their communities and the buildings constructed within them. Structures are expected to be designed and constructed to rigorous standards of workmanship and safety while at the same time incorporating all the features which contribute to speed of erection, financial efficiency and user satisfaction. The construction industry is one of the major employment fields in Canada, turning over a large proportion of the total dollar volume of business in the country. These two factors, high public expectation of the industry and the dynamic nature of the industry, present both a challenge and an opportunity — attractive criteria for any career.

Job Opportunities

Since graduates have the advantage of understanding buildings from several perspectives — the architectural and structural elements; the mechanical, plumbing, drainage and electrical systems; the cost implications and the contractual and managerial processes — they will be able to fill technological positions which lie between the professional architect, engineer and contractor on the one hand, and the skilled tradesman on the other.

With experience, graduates of Building Technology become senior drafting personnel, job captains, specification writers, estimators or contracts managers, building inspectors, officials in property management departments, appraisers and assessors, partners in construction organizations and technical representatives for building supplies and equipment manufacturers. Many graduates will become estimators with general and sub-trade contractors, preparing bids and checking job costs and progress some. Instruction is also given in appraisal and assessment, leading to employment with public and private agencies. The growing field of Building Technology presents opportunities in consulting offices, assisting in design, specification writing and construction inspecting; with contractors doing estimating, shop drawings and supervision; with suppliers explaining the capabilities and application of equipment and systems.

The Program

The Building Technology program is designed to give both men and women a sound preparation for rewarding careers in many facets of the construction industry.

First year courses are common to all students and in addition to English, math and physics, include various basic technological subjects. Lecture instruction, drafting room practice and field trips are part of the program, and students are often able to further their education through summer jobs with architects, engineers, contractors or by doing inspection work for public and private agencies.

In their second year, students (subject to their demonstrated ability and departmental approval) will be placed in one of two specialized majors: Architectural and Economics. Information on these two electives is available from the Program Head.

The *Architectural* Major is intended for those students who plan to work in architectural design and drafting offices. Subjects such as design, drafting, rendering techniques and graphics are studied to enhance expertise in this area.

The *Economics* Major is intended for those students who plan to work in construction and project management offices. It is concerned with costing and the evaluation of property and construction, either in the drawing stage or already constructed.

Post-graduation

The Architectural Institute of British Columbia offers graduates credit for some of the examinations in their syllabus of studies for articled students. The Canadian Institute of Quantity Surveyors will accept graduates as Probationer Members, and give credit in a similar manner. The Building Technology program is fully accredited by the Applied Science Technologists and Technicians of B.C. Information on these professional development possibilities is available from the Program Head.

Prerequisite

English 12, Algebra 12 plus Physics 11, all with C+ are course requirements for this program.

Faculty and Staff

R.I. McNeil, B.Surv., B.C.L.S., D.L.S., Dipl. Adult. Ed., P.Eng., Department Head
F.A.A. Alfeld, Dipl.Eng.
G. Berkenpas, Senior Instructor
R. Guerin
D.C. Hale, Dipl.T.
G.M. Hardie, M.Ed., F.R.I.C.S., Program Head
H.E. Kuckein, M.A.I.B.C., M.R.A.I.C., Senior Instructor
J. Lancaster, B.Comm., M.C.I.Q.S.
A. Maharajh, Dipl.T., A.Sc.T.T., M.C.I.Q.S.
J.A. McInnes, P.Eng.,
M. Stepler, Dipl.T., A.Sc.T.T., Dipl.T. Adult Ed. (on leave)
D.D. Workman
M. Kuzych, B.Arch., M.R.A.I.C., M.A.I.B.C.
T. Thonig, Dipl.T.

TECHNOLOGY: Building

Level 1		Classroom hours per week
BLDG 101	Drafting	4.0
BLDG 102	Building Construction 1	5.0
BLDG 103	Materials and Methods	4.0
BLDG 104	Construction Site Processes	3.0
BLDG 108	Introduction to Computers	2.0
CIVL 135	Building Structures 1	3.0
MATH 140	Basic Technical Mathematics	5.0
MSYS 101	Plumbing	3.0
TCOM 101	Technical Communication	4.0

Level 2	(Term 2A 10 weeks)	Classroom hours per week
BLDG 105	Construction Contracts 1	2.0
BLDG 201	Planning	4.0
BLDG 202	Building Construction 2	6.0
CIVL 236	Building Structures 2	3.0
MATH 240	Calculus and Analytic Geometry	5.0
MSYS 202	Heating and Ventilating 1	4.0
OPMT 185	Project Management	2.0
PHYS 219	Physics	4.0

Level 2	(Term 2B 10 weeks)	Classroom hours per week
BLDG 201	Planning	4.0
BLDG 202	Building Construction 2	6.0
BLDG 206	Construction Estimating 1	4.0
CIVL 236	Building Structures 2	3.0
ELEC 150	Illumination	3.0
MATH 240	Calculus 1 and 2 with Analytical Geometry	5.0
PHYS 219	Physics	4.0
TCOM 201	Technical Communication	3.0

PROGRAM: Architectural Major

Level 3		Classroom hours per week
BLDG 302	Building Construction 3 for Architectural Major 1	4.0
BLDG 306	Construction Estimating 2	4.0
BLDG 309	Architectural Major 1	6.0
CIVL 337	Building Structures 3	3.0
ELEC 250	Electrical Systems	4.0
OPMT 260	Management Engineering 1	2.0
PHYS 319	Physics	4.0

Level 4	(Term 2A 10 weeks)	Classroom hours per week
BLDG 305	Construction Specifications	2.0
BLDG 402	Construction 4 for Architectural Major 2	6.0
BLDG 406	Construction Estimating 3	4.0
BLDG 409	Architectural Major 2	6.0
BLDG 413	Codes and Regulations	2.0
BLDG 419	Building Acoustics	3.0
CIVL 438	Building Structures 4	3.0
OPMT 360	Management Engineering 2	2.0
TCOM 301	Advanced Technical Communication	2.0

Level 4	(Term 2B 10 weeks)	Classroom hours per week
BLDG 205	Construction Contracts 2	2.0
BLDG 305	Construction Specifications	2.0
BLDG 402	Construction 4 for Architectural Major 2	6.0
BLDG 406	Construction Estimating 3	4.0
BLDG 409	Architectural Major 2	6.0
CIVL 438	Building Structures 4	3.0
MECH 412	Space Conditioning	3.0
SURV 120	Introduction to Survey	3.0

PROGRAM: Economics Major

Level 3		Classroom hours per week
BLDG 306	Construction Estimating 2	4.0
BLDG 312	Construction 3 for Economics 1	6.0
BLDG 316	Economics Major 1	6.0
CIVL 337	Building Structures 3	3.0
ELEC 250	Electrical Systems	4.0
OPMT 260	Management Engineering 1	2.0
PHYS 319	Physics	4.0

Level 4	(Term 2A 10 weeks)	Classroom hours per week
BLDG 305	Construction Specifications	2.0
BLDG 406	Construction Estimating 3	4.0
BLDG 412	Construction 4 for Economics 2	6.0
BLDG 416	Economics Major 2	6.0
CIVL 438	Building Structures 4	3.0
MATH 440	Mathematical Methods and Computing for Building	4.0
OPMT 360	Management Engineering 2	2.0
TCOM 301	Advanced Technical Communication	2.0

Level 4	(Term 2B 10 weeks)	Classroom hours per week
ADMN 311	Industrial Management	4.0
BLDG 205	Construction Contracts 2	2.0
BLDG 305	Construction Specifications	2.0
BLDG 406	Construction Estimating 3	4.0
BLDG 412	Construction 4 for Economics 2	6.0
BLDG 413	Codes and Regulations	2.0
BLDG 416	Economics Major 2	6.0
MECH 412	Space Conditioning	3.0
SURV 120	Introduction to Survey	3.0

Course Descriptions

ADMN 311 Industrial Management — Designed to give students an understanding of business management and an opportunity to apply principles and techniques through analysis of business case-problems.

BLDG 101 Drafting — Elementary drafting techniques; lettering and symbols; orthographic, isometric and axonometric projections; perspective; shades and shadows. Drawing board practice of foregoing components.

BLDG 102 Building Construction 1 — Principles of building construction in terms of the assembly of materials. Examination of typical systems of wood and masonry construction. Study of architectural detailing and the origins and purposes of building and zoning by-laws. Application of the above components to the preparation of working drawings.

BLDG 103 Materials and Methods — Physical and chemical properties of common construction materials. Standards and gradings for materials. Construction methods and building procedures. Field studies and examination of sample products. Filing and retrieval of technical literature.

BLDG 104 Construction Site Processes — Job site management. Planning, implementation and control of site construction processes. Supervision of construction activities. Contractual relationships and documentation. Application of field studies to actual practice layouts.

BLDG 105 Construction Contracts 1 — Fundamentals of contracts. Parties to construction contracts. Basic types of construction contracts. Relationship between information and risk. Standard forms of construction contracts used in Canada and elsewhere. Appropriate documentation and related issues.

BLDG 108 Introduction to Computers — Computers as machines. Computers as management devices. Hardware and software defined. Aspects of programming, operating, and networking. Demonstrations of practical applications in building technology. Hands-on practice and research assignments related to the topic.

BLDG 201 Planning — Fundamentals of functional building design. Planning and organization of residential spaces. Design of simple utilitarian objects. Elementary architectural design problems and presentation techniques. Prerequisite: BLDG 101.

BLDG 202 Building Construction 2 — Continuation of BLDG 102. Prerequisite: BLDG 102.

BLDG 205 Construction Contracts 2 — Continuation of BLDG 105. Detailed examination of contents of current standard forms of Canadian construction contracts. Contractual procedures involving payments and adjustments. Application of principles to actual cases. Study of recent litigation involving construction contracts. Responsibilities for design and advice. Prerequisite: BLDG 105.

BLDG 206 Construction Estimating 1 — Introduction to general theories of measurement and pricing of construction work. Specific study of particular methods of measurement. Application to elementary examples of work. Introduction to bidding procedures and documentation. Sources of cost data. Introduction to computer applications for estimating. Prerequisite: BLDG 103.

BLDG 302 Building Construction 3 for Architectural Major 1 — Continuation of BLDG 202. Examination of typical systems of construction in heavy timber, steel and concrete. Site fabrication and assembly; prefabrication. Selection and location of materials in buildings. Extensive preparation of working drawings. Field trips to building sites and fabrication plants. Prerequisite: BLDG 202.

BLDG 305 Construction Specifications — Fundamentals of language as a means of communication. Style in specifications. Organization and presentation of information in construction contract documentation. Filing and retrieval of construction information using Masterformat. Preparation and reproduction procedures for production of project manuals. Use of word-processing equipment for specifications. Practical applications. Prerequisite: BLDG 103.

BLDG 306 Construction Estimating 2 — Continuation of BLDG 206. More detailed study and application of measurement and pricing of work of specific trades with emphasis on concrete work. Examination of CIQS Methods of Measurement of Construction Work. Prerequisite: BLDG 206.

BLDG 309 Architectural Major 1 — Short history of contemporary architecture and building. Conceptualization and planning. Theory, aesthetics and structure as integral parts of design.

BLDG 312 Construction 3 for Economics 1 — Same as BLDG 302, but with less emphasis on drawing board skills and more emphasis on construction implementation procedures. Prerequisite: BLDG 202.

BLDG 316 Economics Major 1 — Principles of land development, use and title. Appraisal and assessment of property values for purchase, sale, taxation and other purposes. Techniques of analysis and synthesis of construction project costs. Sources of cost information and data.

BLDG 402 Construction 4 for Architectural Major 2 — Continuation of BLDG 302, for Architectural Major. Prerequisite: BLDG 302.

BLDG 406 Construction Estimating 3 — Continuation of BLDG 306. Measurement and unit pricing of specific construction trades. Preparation of estimate summaries and bids or proposals to owners or clients. Construction cost accounting. Documentation used in estimating and cost accounting processes. Bid strategies, bid depositories, bid procedures in general. Prerequisite: BLDG 302.

BLDG 409 Architectural Major 2 — Continuation of BLDG 309. Graphics and freehand drawing of architectural subject matter. Advanced perspective drawing in a variety of media. Architectural model making. Extensive seminar discussions, guest lecturers and field trips. Prerequisite: BLDG 309.

BLDG 412 Construction 4 for Economics 2 — Continuation of BLDG 312, for Economics Major. Prerequisite: BLDG 312.

BLDG 413 Codes and Regulations — Building Law in Canada. A general survey of codes and regulations affecting design and construction, including zoning and professional practice. Specific study of the National Building Code, with particular reference to use and occupancy, and the control of fire hazards. Prerequisite: BLDG 302 or BLDG 312.

BLDG 416 Economics Major 2 — Continuation of BLDG 316. Financial management; contract management. Cost accounting and budget control methods. Bid strategies and procedures. Development of feasibility studies. Presentation of reports on construction economic affairs and jobsite controls. Techniques of costing, pricing and analysis of economic data. Prerequisite: BLDG 316.

BLDG 419 Building Acoustics — Theory and principles of sound, including properties, propagation, sources and measurement techniques. Noise criteria and control of noise in buildings. Selection of materials having appropriate acoustical and aesthetic qualities for buildings. Calculations encountered in acoustical considerations. Prerequisite: BLDG 302 and 309.

CIVL 135 Building Structures 1 — Basic theory of statics including the calculation of loads acting on structures, and the calculation of support reactions and internal axial and shear forces and bending moments due to the applied loads. Students will be expected to analyse simple trusses and plot shear and bending moment diagrams for beams. This course lays the groundwork for subsequent courses in strength of materials and elementary structural design, and is presented in lectures followed by tutorial problem solving sessions.

CIVL 236 Building Structures 2 — The link between statics and design, this course concentrates initially on various types of stress, including shear, bending and buckling stresses. Investigation of properties of sections, shear forces, bending moments, deflections, loads, methods of framing and site visits, allow for analysis of existing buildings and use of the timber design manual. Prerequisite: CIVL 135.

CIVL 337 Building Structures 3 — The emphasis in this course is placed on elementary structural design concepts for timber, steel and reinforced concrete structures. Students are familiarized with design aids such as handbooks, manuals, catalogues and tables used in the construction industry. Architectural students study primarily timber structures, including concrete formwork design. All other students study a more condensed course including timber, steel and concrete. Concepts such as lateral stability and resistance to wind and earthquake forces are included. Prerequisite: CIVL 236.

CIVL 438 Building Structures 4 — Architectural students study elementary reinforced concrete design including an appreciation of its variations, such as prestressed concrete and reinforced masonry, followed by an introduction to soils engineering including compaction, foundation systems and retaining walls. All other students take a shorter course including bolted and welded connections of steel members, a condensed version of the soils engineering mentioned above, and an introduction to concrete formwork design. Prerequisite: CIVL 337.

ELEC 150 Illumination — Deals with the types and characteristics of lighting sources; quantity and quality of light; lighting units, terminology and calculations.

ELEC 250 Electrical Systems — Students learn how to plan the electrical system for a specific building, with the electrical designer. How to read and work with common electrical drawings and specifications, understand single and three-phase systems, and power factor correction for minimumal operations costs; recognize and avoid building designs that create costly electrical design problems. Prerequisite: ELEC 150.

MATH 140 Basic Technical Mathematics — Quadratic equation and systems of linear equations. Radian measure. Trigonometric functions, solution of triangles, and vectors. Irregular areas and volumes. Exponential/logarithmic theory and transformations, common and natural logarithms, and logarithmic/semilogarithmic graphs. Variation, straight line equation, and curve fitting. Linear programming.

MATH 240 Calculus 1 and 2 with Analytic Geometry — Conic sections and polar/rectangular transformations. Limits, the derivative, differentiation rules for algebraic, trigonometric, logarithmic and exponential functions, curve sketching, implicit differentiation, higher order derivatives, applied maxima/minima, related rates and differentials. Antidifferentiation, the indefinite integral and the definite integral including area, volume, centroid and moment of inertia.

MATH 440 Mathematical Methods and Computing — BASIC arithmetic and functions, input/output statements, relational operators, branching statements, strings and arrays. Linear programming using the simplex method and the transportation problem. Cost estimating computer case study.

MECH 412 Space Conditioning — The student will study and analyze factors influencing indoor comfort, including building solar orientation, evaluation of cooling loads, properties of air, air-conditioning processes, and gain an overview of air conditioning methods.

MSYS 101 Plumbing — Topics include codes, basic engineering principles and graphic presentations related to plumbing systems design, load calculations, piping methods, sizing of system components for storm and sanitary drainage and water distribution. Some drafting skill will be required.

MSYS 202 Heating and Ventilating 1 — Covers the principles involved with heat loss in buildings and practises of heating and ventilating encompassing a study of system components and design procedures. These will then be applied to the preparation of heat loss calculations and working drawings for a heating/ventilating system.

OPMT 185 Project Management — An introduction to the fundamentals of Critical Path Method (CPM) as it applies to project planning, scheduling and control, and project management. The course includes arrow, precedence and time logic diagrams; resource allocation, time cost analysis and the role of the computer.

OPMT 260 Management Engineering 1 — Applies the systematic problem-solving and decision-making approach to construction industry problems. The course includes computerized facilities planning; work study, using recognized method study techniques to examine and improve the way in which a job is accomplished; recognized work measurement techniques for estimating, planning and cost control and engineering economics.

OPMT 360 Management Engineering 2 — Techniques of work innovation and management problem-solving. Goal setting, agreement creation, work measurement and documentation. Uses computer software for project management with emphasis on the manager's perspective.

PHYS 219 Physics — A general physics course designed to meet the specific needs of the Building Technology. There is a lab component. Topics include: mechanics — statics, kinematics, dynamics, work and energy, basic machines; electricity and magnetism — electrostatics, basic circuits, electromagnetic effects; electric motors; matter — solids, liquids and gases, hydrostatics, fluid flow; heat and thermodynamics — change of state, heat transfer, heat engines, energy sources; wave and simple harmonic motion — mechanical and acoustical vibrations.

PHYS 319 Physics — A general physics course designed to meet the specific needs of the Building Technology. There is a lab component. Topics include: mechanics — statics, kinematics, dynamics, work and energy, basic machines; electricity and magnetism — electrostatics, basic circuits, electromagnetic effects; electric motors; matter — solids, liquids and gases, hydrostatics, fluid flow; heat and thermodynamics — change of state, heat transfer, heat engines, energy sources; wave and simple harmonic motion — mechanical and acoustical vibrations.

SURV 120 Introduction to Survey — An introduction to engineering survey; linear distance; the theory and use of theodolite; direction, bearing and angles; use of traverses in site engineering; elevations, use and theory of the level, how to use the plane table.

TCOM 101 Technical Communication — In this course students learn the basic techniques and applications of written and spoken communication. Assignments are related as closely as possible to the practical careers of Building Technology students, including direct and persuasive requests, informational memos, job application letters and resumes.

TCOM 201 Technical Communication — In this applied communication course students learn the theory and practice writing different types of short reports based on industry-related case studies. They learn report formats and write occurrence, trip progress, investigation and recommendation reports. Prerequisite: TCOM 101.

TCOM 301 Advanced Technical Communication — In this course, students concentrate on two problems of particular relevance to second-year students — obtaining employment and writing presentations. They update their job search packages and write proposals, follow-up letters, progress reports, a formal technical report and give an oral technical briefing. Prerequisite: TCOM 101, TCOM 201.

Civil and Structural

Civil and Structural technologists are involved in the design and construction of highways, bridges, airports, railways, municipal works, power developments, dams, canals, docks and harbors. The field has enormous creative potential and offers the technologist involvement in all phases of a project, from design stage to finished job.

Job Opportunities

Graduates find employment as inspectors, construction supervisors, testing lab technicians, design detailers and investigation and construction technologists in government and in private industry. A number of graduates have founded their own consulting or construction businesses. Others are placed in engineering, contracting, surveying or architectural firms as project managers or supervisors, or to work in design or analysis. These jobs usually entail an equal amount of time spent outdoors as indoors. Fieldwork usually takes place from spring to fall.

The Program

The diverse and stimulating program includes field trips to assist students in developing their creativity, ingenuity and critical abilities, as well as major projects in which the student develops, in consultation with professionals, appropriate methods of approach and solution. In the second year, students may choose their options to provide a degree of specialization in varying ares of the civil or structural technology. These include Geotechnical, Highways Traffic, Water Resources, Construction and Structures.

The program has been accredited at the technologist level by the Applied Science Technologists and Technicians of B.C. and, upon completion of the BCIT diploma program, graduates are eligible for membership in the Society.

Prerequisite

Algebra 12 and Physics 11 are course requirements for this program. Applicants should be skilled in the use of the English language, have good mathematical ability and be interested in the physical sciences. Drawing or sketching ability is useful.

Exemption from the academic requirements may be made in the case of mature applicants with applicable practical experience.

Transfer

Graduates of the Civil and Structural Program with a sufficiently high standing are granted full credit for their work at BCIT by the University of Lakehead Civil Engineering Department. After taking summer school they are then eligible to enter fourth year engineering directly and graduate with an accredited degree in two years. Students with a high academic standing also obtain good transfer credits to other Canadian Universities such as the University of Waterloo.

Faculty and Staff

R.I. McNeil, B.Surv., B.C.L.S., Dipl. Adult Ed., P.Eng., Department Head
T. Abbuhl, Dipl.T., A.Sc.T.
A.R. Barren, B.Sc., Ph.D., P.Eng., Program Head
R.B. Brown, Dipl.T., A.Sc.T.
R. Butler, M.I.C.E., M.I. Struct E., C.Eng., P.Eng.
P. Cunnington, B.Sc., P.Eng.
D. Graham, B.A.Sc., M.A.Sc., P.Eng.
M.J. Heinekey, B.Tech., Dipl.T., Dipl. Adult Ed., A.Sc.T.
G.Q. Lake, B.A.Sc., P.Eng.,
J. McLean, B.Ed., A.Sc.T.
C.A. Payne, B.A.Sc., M.A.Sc., P.Eng.
E. Reid, M.I.C.E., C.Eng., P.Eng.
B. Samson, B.A.Sc., M.A.Sc.
R.C. Starr, B.Eng., M.A.Sc., P.Eng. Chief Instructor
C.E. Wade, B.Sc., M.I.T.E., P.Eng., on leave

TECHNOLOGY: Civil and Structural

Level 1		Classroom hours per week
CIVL 101	Statics	6.0
CIVL 103	Hydrology	3.0
CIVL 109	Construction Materials 1	3.0
MATH 142	Basic Technical Math	5.0
MECH 101	Drafting Fundamentals	2.0
PHYS 107	Physics	5.0
SURV 130	Survey	3.0
TCOM 103	Technical Communication	3.0

Level 2	(Term 2A 10 weeks)	Classroom hours per week
CIVL 202	Strength of Materials	6.0
CIVL 207	Hydraulics 1	3.0
CIVL 211	Civil Computer Applications 1	3.0
MATH 242	Calculus 1 and 2	5.0
MECH 202	Drafting	2.0
PHYS 207	Physics	5.0
SURV 230	Survey	3.0
TCOM 203	Technical Communication	3.0

Level 2	(Term 2B 10 weeks)	Classroom hours per week
CIVL 203	Elementary Structural Design	6.0
CIVL 207	Hydraulics 1	3.0
CIVL 211	Civil Computer Applications	3.0
MATH 242	Calculus 1 and 2	5.0
MECH 202	Drafting	2.0
PHYS 207	Physics	5.0
SURV 230	Survey	3.0
TCOM 203	Technical Communication	3.0

PROGRAM: Geotechnical and Highways/Traffic

Level 3		Classroom hours per week
CIVL 304	Structural Design General	6.0
CIVL 308	Hydraulics 2	3.0
CIVL 313	Subdivision Planning and Street Design	6.0
CIVL 325	Soil Mechanics 1	6.0
MATH 342	Matrix Methods	4.0
SURV 330	Survey for Civil and Structural	3.0
TCOM 302	Advanced Technical Communication	2.0

Level 4	(Term 2A 10 weeks)	Classroom hours per week
CIVL 412	Municipal Services	6.0
CIVL 426	Soil Mechanics 2	6.0
CIVL 432	Construction Estimating	3.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 180	Construction Management 1	3.0
PHOT 127	Photo Interpretation	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

Level 4	(Term 2B 10 weeks)	Classroom hours per week
CIVL 410	Construction Materials 2	3.0
CIVL 417	Highway Design	6.0
CIVL 427	Soil Mechanics 3	6.0
CIVL 436	Construction Planning	3.0
MATH 442	Statistics for Civil and Structural	4.0
PHOT 127	Photo Interpretation	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

PROGRAM: Water Resources

Level 3		Classroom hours per week
CIVL 304	Structural Design General	6.0
CIVL 308	Hydraulics 2	3.0
CIVL 313	Subdivision Planning and Street Design	6.0
CIVL 325	Soil Mechanics 1	6.0
MATH 342	Matrix Methods	3.0
SURV 330	Survey for Civil and Structural	3.0
TCOM 302	Advanced Technical Communication	2.0

Level 4	(Term 4A 10 weeks)	Classroom hours per week
CIVL 412	Municipal Services	6.0
CIVL 416	Water Resources	3.0
CIVL 426	Soil Mechanics 2	6.0
CIVL 432	Construction Estimating	3.0
MATH 442	Statistics	4.0
OPMT 180	Construction Management 1	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

Level 4	(Term 4B 10 weeks)	Classroom hours per week
CIVL 410	Construction Materials 2	3.0
CIVL 416	Water Resources	3.0
CIVL 417	Highway Design	6.0
CIVL 436	Construction Planning	3.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 280	Construction Management 2	3.0
PHOT 127	Photo Interpretation	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

PROGRAM: Construction

Level 3		Classroom hours per week
CIVL 304	Structural Design General	6.0
CIVL 308	Hydraulics 2	3.0
CIVL 313	Subdivision Planning and Street Design	6.0
CIVL 417	Highway Design	6.0
MATH 342	Matrix Methods	3.0
SURV 330	Survey for Civil and Structural	3.0
TCOM 302	Advanced Technical Communication	2.0

Level 4	(Term 4A 10 weeks)	Classroom hours per week
CIVL 325	Soil Mechanics 1	6.0
CIVL 412	Municipal Services	6.0
CIVL 423	Structures 2	6.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 180	Construction Management 1	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

Level 4	(Term 4B 10 weeks)	Classroom hours per week
CIVL 410	Construction Materials 2	3.0
CIVL 426	Soil Mechanics 2	6.0
CIVL 432	Construction Estimating	3.0
CIVL 433	Construction Detailing	3.0
CIVL 436	Construction Planning	3.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 280	Construction Management 2	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

PROGRAM: Structures

Level 3		Classroom hours per week
CIVL 308	Hydraulics 2	3.0
CIVL 313	Subdivision Planning and Street Design	6.0
CIVL 322	Structures 1	6.0
CIVL 417	Highway Design	6.0
MATH 342	Matrix Methods	3.0
SURV 330	Survey	3.0
TCOM 302	Advanced Technical Communication	2.0

Level 4	(Term 4A 10 weeks)	Classroom hours per week
CIVL 325	Soil Mechanics 1	6.0
CIVL 423	Structures 2	6.0
CIVL 432	Construction Estimating	3.0
CIVL 434	Structural Detailing	3.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 180	Construction Management 1	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

Level 4	(Term 4B 10 weeks)	Classroom hours per week
CIVL 410	Construction Materials 2	3.0
CIVL 424	Structures 3	6.0
CIVL 426	Soil Mechanics 2	6.0
CIVL 436	Construction Planning	3.0
MATH 442	Statistics for Civil and Structural	4.0
OPMT 280	Construction Management 2	3.0
SURV 430	Survey for Civil and Structural	3.0
TCOM 401	Advanced Technical Communication	2.0

Course Descriptions

CIVL 101 Statics — Vectors, force systems, graphical analysis, resultants, components, moments, equilibrium laws, force polygons, funicular polygons, frames and trusses, stress diagrams, Bowes' notation, flexible tension members, load shear and bending moment curves. Closely supervised problem sessions are used to provide the student with practice in common analytical and graphical solutions to problems of static load on statically determinate structures.

CIVL 103 Hydrology — This introductory course presents the basic concepts and techniques of small watershed analysis and the type of work involved in the design, supervision and construction of drainage facilities. The course will present the fundamentals of practical hydrology including: the hydrologic cycle; precipitation types and measurement; snowmelt, runoff and streamflow; basic frequency analysis and open channel flow. Lectures, assigned problems, and two design projects will be used to demonstrate the principles involved.

CIVL 109 Construction Materials 1 — Introduces the fundamentals of construction materials — concrete, asphalt, and aggregates. Students learn to perform basic tests on these materials in accordance with established standards and recommended industry laboratory procedures. In addition, students learn to sample, inspect and test these materials under civil project conditions.

CIVL 202 Strength of Materials — Simple stresses; stress, strain, elasticity; compound bars and columns; temperature stress; elastic limit, limit of proportionality; yield; ultimate; factor of safety; load factor; ductility; resilience; fatigue; shock. Properties of sections; bending moments; shear forces; theory of flexure; slopes and deflection of beams; restrained and continuous beams. Strut theories; eccentric loading, lateral loading. Testing techniques; machines; extensometers; strain gauges; brittle lacquers; photo elasticity; evaluation of results. Prerequisite: CIVL 101.

CIVL 203 Elementary Structural Design — Having previously studied forces and material properties, students learn to apply these to the analysis of real structures. They also study the effects of wind, snow and earthquake loads as determined by national

standards. Design and analysis of steel and timber beams, columns and trusses and their connections are used as examples. Prerequisite: CIVL 202.

CIVL 207 Hydraulics 1 — Through problem sessions and lectures, the student learns to determine the hydrostatic forces exerted by water on a variety of structures, gates, tanks and dams. As part of a project, the student analyzes a complex tank full of water to determine the forces and centres of pressure. Special problems of hydrostatic pressures produced in accelerated or rotated fluids are given. Further problem sessions lead to the understanding of energy transfers and losses in pipe systems and the significance of friction losses in waterworks systems. In this part of the course, the student analyzes a simple pump-driven circulation system and graphs all energy gradients in profile along the system. Evaluation is by individual interview, problems and quizzes.

CIVL 211 Civil Computer Applications — BASIC language commands, statements, line numbers variables, string variables, expressions, input/output logic including algebra employing arrays, built in functions, subroutines, random access and sequential access files, screen graphics. Projects using BASIC; FORTRAN compared to BASIC; mainframe file editing/printing using CMS/VM spreadsheets; word processing data bases. Highway terminology — horizontal/vertical curves. Introduction to Canadian standards.

CIVL 304 Structural Design General — Designed for students taking Civil options. Through analysis and design projects, students are introduced to reinforced concrete as a structural material. The effects of continuity with structures are discussed in lectures and connection details for all structural components in basic building materials are developed. Prerequisite: CIVL 203.

CIVL 308 Hydraulics 2 — Lectures and assignments on open and closed channel flow including distribution of flow pipe networks, water-hammer, and stresses in pipes. Hydraulic element chart and specific energy in open channel and culvert flow. Prerequisite: CIVL 207.

CIVL 313 Subdivision Planning and Street Design — Through this introduction to the physical layout of urbanization, the student learns to systematically subdivide a piece of land in accordance with recommended standards using imagination and creativity. Design a major street to recommended standards including geometrics, elevation tables, catch basin locations and rotation of crown; and to design a minor street complete with intersection, curb returns and appropriate drainage. The topic is viewed from the range of planner, engineer, developer, consumer and resident, and the knowledge could be used working for a developer, municipal planner or engineer, or a consulting engineer or contractor. This course offers the opportunity to make decisions and to actually design a civil works project. Briefs are produced and there is exposure to designing an office environment as well. Prerequisite: CIVL 206.

CIVL 322 Structures 1 — Heavy emphasis is placed on statically indeterminate structures in this, the first of three second year structures courses. In addition to determining the design criteria for continuous beams and frames by the use of moment distribution, reinforced concrete designs for one way slabs, continuous beams and columns, as well as retaining walls, are investigated. The designs are "drafted" and "reinforced" with site visits. Prerequisite: CIVL 203.

CIVL 325 Soil Mechanics 1 — Through lectures and laboratory work the principles of basic soil mechanics and soil testing are covered. Topics include mass/volume relationships, soil classification, compaction, geology, subsurface investigation, permeability and pressured diagrams, effective stress, consolidation, shear strength.

CIVL 410 Construction Materials 2 — Introduction to the design of Portland cement and asphaltic concrete as materials. Students learn to design concrete to specified strength and perform Marshall design on asphalt. The course also includes an introduction to cement chemistry and manufacturing, non-destructive testing and statistical analysis of concrete; the analysis and interpretation of Marshall designs of asphalt. Inspection techniques for construction material in general and specific emphasis on inspection procedures, reporting and safety for civil engineering will be covered in this course. As per CIVL 417 with additional topics relevant to highway structures such as bridge abutments, multiplate culverts, etc. Prerequisite: CIVL 109.

CIVL 412 Municipal Services — Students plan a residential subdivision for a piece of accessible raw land and design an arterial street bordering the subdivision and specific minor streets and intersections within the subdivision. The instructor acts as supervisor and consultant to students. Lectures on the basics of neighborhood planning and on design standards and methods are given as needed. The plan includes the waterworks distribution system, sanitary sewers and storm sewers and their design with full plans and profile drawings for each service. Through preparatory lectures and discussions, the student is introduced to municipal road standards, crown and drainage, street geometry, street appurtenances, paving methods, domestic fire and industrial water demands, water distribution design methods, distribution reservoirs and pressure control, pumping, sewer flows and sewer design, sewage pumping stations and loads on buried conduits. Field trips are made to municipal operations. Prerequisite: CIVL 207, CIVL 206.

CIVL 416 Water Resources — Lectures and problem sessions present the analysis of surface runoff by the rational formula and unit hydrograph, mass curves for water supply storage, flood routing and detention storage. The use of the computer in predicting water resources and quality (mathematics modelling) is covered. Prerequisite: CIVL 207 or CIVL 105.

CIVL 417 Highway Design — Students will complete the preliminary design of a section of rural highway in B.C. Working in groups, students will establish curve radii, spiral lengths, curve data, stations, curve superelevation, superelevation development, centre line profile, vertical curve lengths, typical section details, drainage details, culvert sizes. Using an earthwork computer program students will optimize earthworks by manipulating input files on vertical alignment, typical section and superelevation and by analysis of resulting mass haul. Preliminary working drawings will also be prepared. Prerequisite: CIVL 206, CIVL 207, CIVL 211.

CIVL 423 Structures 2 — Through analysis and design projects, students continue to achieve appreciation and understanding of structures. Emphasis is placed on computer aided structural analysis and design, and on formwork design. Students will acquire the ability to present calculations, sketches and drawings in a clear, concise, professional manner, and to solve problems within a specified time limit. A field trip to inspect a structure under construction is included. Prerequisite: CIVL 322.

CIVL 424 Structures 3 — An existing bridge is chosen in consultation with the instructor, and the student designs, aligns and details an alternative crossing to the original. The student learns about layout, moving loads, influence lines, continuous girders,

trusses, arches, deflections of spans, bridge deck floor systems, sway bracing, deck slabs, joint details, piers and abutments and piling. Prerequisite: CIVL 423.

CIVL 426 Soil Mechanics 2 — This course applies the knowledge learnt in CIVL 325 to a variety of geotechnical, foundation and drainage design problems. Projects include seepage studies and stability analysis of soil slopes, earth pressures and retaining structures, foundation design. Prerequisite: CIVL 325.

CIVL 427 Soil Mechanics 3 — Lectures, laboratory and project work and guest lectures cover the following topics: geotechnical aspects of tailings dam design, construction and maintenance; triaxial soil testing; maintenance and operation of laboratory/field electronic equipment; reinforced earth; elementary rock mechanics. Prerequisite: CIVL 426.

CIVL 432 Construction Estimating — The student is involved in construction estimate preparation both as an individual and as a member of a team. Lectures illustrate the procedures for taking off quantities, establishing productivity forecasts and unit costs, and accounting and job control methods.

CIVL 433 Construction Detailing — Introduction to the practical aspects of taking-off, fabrication, and the placing and inspecting of reinforcing steel in concrete structures. Field trips to fabricating plants and construction sites augment classroom instruction.

CIVL 434 Structural Detailing — Students are required to design and detail connections, and draw solutions to detailing problems taken from structures used in other related courses, i.e. timber, steel and reinforced concrete. Includes bill of materials and reinforcing bar lists.

CIVL 436 Construction Planning — Introduction to the time-value of money and the application of sound economic principles to comparison of construction alternatives and acquisition and maintenance of equipment. A major construction project is analyzed by the student emphasizing critical path planning and the optimum use of resources. Planning for construction projects involving repetitive operations is demonstrated by worked examples. Construction industry guests lecture on current projects and the responsibility of the technologist.

MATH 142 Basic Technical Mathematics for Civil and Structural — Quadratic equation and systems of linear equations. Radian measure. Trigonometric functions, solution of triangles, and vectors. Irregular areas and volumes. Exponential/logarithmic theory and transformations, common and natural logarithms, and logarithmic/semilogarithmic graphs. Variation, straight line equation, and curve fitting. Linear programming.

MATH 242 Calculus 1 and 2 for Civil and Structural — Conic sections and polar/rectangular transformations. Limits, the derivative, differentiation rules for algebraic, trigonometric, logarithmic and exponential functions; curve sketching, implicit differentiation, higher order derivatives, applied maxima/minima, related rates and differentials. Antidifferentiation, the indefinite integral and the definite integral including area, volume, centroid and moment of inertia.

MATH 342 Matrix Methods for Civil and Structural — Matrix theory and operations, types of matrices, determinants, matrix inversion, elementary matrix transformations and solution of systems of linear equations. Linear programming using the Simplex method. Network analysis.

MATH 442 Statistics for Civil and Structural — Organization and graphical presentation of data, frequency distributions and measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Method of least squares and regression and correlation. Time series analysis. Control chart concepts and application, acceptance sampling.

MECH 101 Drafting Fundamentals — An introductory course for persons with little or no experience in graphics. (Students are required to purchase drafting equipment and supplies on the first night of class) Students learn to produce and read simple drawings. Topics include scales, geometric constructions, basic orthographics detail interpretation, line visibility, dimensioning, auxiliary views, true shape, inclined and skew surfaces, sections, pictorials, working drawings and freehand sketches.

MECH 202 Drafting (Civil and Structural) — Intersections, developments, descriptive geometry, contours, sections, profiles, cut and fill problems. All treated generally on a project basis with civil and structural design procedures.

OPMT 180 Construction Management 1 — An introduction to the fundamentals of the Critical Path Method (CPM) as it applies to project planning, scheduling, control and management. This course includes arrow diagrams, precedence diagrams, resource allocation, time-cost analysis, PERT, bid determination, project management and the role of the computer. The course is designed to meet the needs of the civil engineering student.

OPMT 280 Construction Management 2 — The study of problem-solving in industry, with particular emphasis on heavy construction and manufacturing problems. The course includes method study, process charting, activity sampling, work measurement; motion economy and productivity. Special emphasis is placed on the human problems associated with change. The course is particularly slanted towards civil engineering.

PHOT 127 Photo Interpretation — Civil and Structural — Covers the fundamentals of aerial photo interpretation, basic photo interpretation equipment, geologic and soil mapping, air photo interpretation for terrain evaluation, engineering applications of aerial photo interpretation including site evaluation and route location. The fundamentals of photogrammetry and the applications of photogrammetric equipment to highway engineering are also covered.

PHYS 107 Physics for Civil and Structural — This is a general level physics course emphasizing the application of physical principles to the Civil and Structural Technology. A section on the application of geophysical exploration techniques used in the technology is included. Topics covered include statics, kinematics, dynamics, energy and power, angular motion, thermal properties of matter, fluid mechanics, wave motion and waves in elastic media, basic electricity and magnetism, instrumentation, optics and atomic and nuclear phenomena. The lab program stresses measurements, data analysis and experimental techniques.

PHYS 207 Physics for Civil and Structural — see PHYS 107.

SURV 130 Surveying — Civil and Structural — Fundamental concepts of surveying; measurement of distances, use of compasses, theodolites, plane tables, levels and chains, site surveys. Calculations relating to traverses, triangulations, areas and volumes; obtaining, recording and plotting topographic detail. Care, maintenance and adjustment of equipment.

SURV 230 Surveying — Civil and Structural — see SURV 130.

SURV 330 Surveying — Civil and Structural — see SURV 130.

SURV 430 Surveying — Civil and Structural — see SURV 130.

TCOM 103 Technical Communication for Civil and Structural — In this course students practice basic writing and word processing skills, and write inquiry, complaint and adjustment letters. They also write several short, technical memos and give an oral report. Assignments and materials are taken from the civil and structural field.

TCOM 203 Technical Communication for Civil and Structural — Students will write job application letters and resumes and learn about job interviews. They write short progress, incident, trip reports and inspection reports common to the Civil and Structural field. They also practice oral reporting. Prerequisite: TCOM 103.

TCOM 302 Advanced Technical Communication for Civil and Structural — Students analyze and write problem-solving, analytical and recommendation reports typical of the civil engineering field. They also learn small group communication theory, write management letters, organize staff and site meetings and participate in role-plays. Prerequisite: TCOM 103, TCOM 203.

TCOM 401 Advanced Technical Communication for Civil and Structural — In this course, students continue practising advanced communication skills such as using word processing to write specifications, how to handle complaints on the telephone, persuasive presentations and technical proposals. The focus of the course is on selling engineering ideas. Prerequisite: TCOM 103, TCOM 203, TCOM 302.

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY
3700 WILLINGDON AVENUE, BURNABY, BRITISH COLUMBIA, CANADA, V5G 3H2 • TELEPHONE: AREA CODE (604)434-1610

APPLICATION FOR ADMISSION

NOTE: • ALL APPLICANTS PLEASE COMPLETE "PART A".
• INCOMPLETE APPLICATIONS MAY BE RETURNED — THIS WILL DELAY PROCESSING.

PART A *PLEASE PRINT CLEARLY IN BALL POINT PEN*

PERSONAL DATA
THIS WILL BECOME YOUR STUDENT NUMBER

Social Insurance Number

For Office Use Only

Student Name: Last Name, First Name

Date of Birth: Month / Day / Year

Sex: ☐ Male ☐ Female

Marital Status: ☐ Single ☐ Married

Country of Citizenship: ☐ Canada ☐ Other _____

Status (If not Canadian): ☐ Landed Immigrant ☐ Student Authorization

MAILING ADDRESS: Number and Street

City/Town | Prov. | Country

Postal Code | Telephone Number ▶ | Area Code | Number

PERMANENT ADDRESS: Number and Street

City/Town | Prov. | Country

Postal Code | Telephone Number ▶ | Area Code | Number

BUSINESS NAME: Name of Company

Department | Position

BUSINESS ADDRESS: Number and Street

City/Town | Prov. | Country

Postal Code | Telephone Number ▶ | Number | Local

EMERGENCY CONTACT: Last Name, First Name

Relationship

EMERGENCY ADDRESS: Number and Street

City/Town | Prov. | Country

Postal Code | Telephone Number ▶ | Area Code | Home Number | Business Number | Local

PART A (Continued From Pg. 1)

MISCELLANEOUS DATA

Is English your primary language? ☐ Yes ☐ No	British Columbia resident since: Month / Day / Year	Are you colour blind? ☐ Yes ☐ No
Please indicate any physical disability(ies):		

EDUCATION

	Name and City, Province, Country of School	Highest Grade Year or Term Completed	Last Attended Month	Last Attended Year
Last Secondary School Attended				
Community College or Institute of Technology				
University				
Additional Education, Including Vocational, Correspondence or Other				
Professional Certification/Registration				

Have you previously:	Month	Year
a) Attended a BCIT Full-Time Program? ☐ Yes ☐ No If "Yes," when?		

b) Requested Program Approval for a BCIT Certificate Program? ☐ Yes ☐ No

WORK EXPERIENCE: Include Full-Time and Part-Time

Employer	Main Duties	From Month	From Year	To Month	To Year

STATISTICAL DATA

Reason(s) for Attending BCIT?

☐ Related to Current Work ☐ Preparation for New Career
☐ Preparation for Advancement ☐ General Interest

Main Activity During Last Twelve (12) Months?

☐ Student ☐ Part-Time Employee
☐ Full-Time Employee ☐ Other _____

CONSENT AND ACKNOWLEDGEMENT

I hereby consent to be bound by and observe all applicable rules, regulations, policies and procedures of BCIT and any amendments made thereto from time to time. I am aware that a copy of all such rules, regulations and procedures is available for review at the office of the Registrar for BCIT and I acknowledge that it is my responsibility to review the same.

Signature	Date

NOTE: INCOMPLETE APPLICATIONS MAY BE RETURNED — THIS WILL DELAY PROCESSING.
FOR MORE DETAILED INFORMATION REFER TO THE BCIT CALENDARS.
CHECK PREREQUISITES IN PUBLICATIONS.

PART B

PROGRAM ADMISSION: Full-Time Study

State the PROGRAM (Technology and Option) you wish to enter. Attach supporting documents; refer to Part E.

First Choice	Second Choice	Third Choice

Start Term — Month | Year

Applying For: ☐ First Year ☐ Second Year ☐ Other (specify) _____

PART C: Part-Time Course by Course Registration. THIS IS NOT FOR FULL-TIME PROGRAM ADMISSION.

Course Number	Course Reference Number	Course Title	Course Cost(s)		Start Date			Site
			Fee	Special Fee	Month	Day	Year	

TOTAL FEES ▶ + =

FOR "MAIL IN" APPLICATIONS ONLY

Payment of Fees: ☐ Full Fees To Be Paid By You ☐ Full Fees To Be Paid By Employer (Approval Attached) ☐ Special Arrangement (Approval Attached)

Paid By: ☐ Cheque/Money Order (Enclosed)

☐ Visa
☐ Mastercard

Card Number:

Valid Date: Month | Year

Expiry Date: Month | Year

TOTAL AMOUNT PAID: $

PART D

EMPLOYER CONTRACTED PROGRAMS			
Start Date with Present Employer	Month Year	Name of Employer	Employer Approval (If Necessary)
District (If Applicable)		Branch Division (If Applicable)	
Employment Status ☐ Regular ☐ Auxiliary		Job Classification	
Next Course Requested	Course Number	Course Name	

PART E

- If you are applying for entry into a DIPLOMA or ADVANCED DIPLOMA PROGRAM attach supporting documents.

NOTE: All documents submitted are deemed to be the property of the Institute. Whether or not a person is accepted for admission, documents are not returned.

1) An official transcript of all secondary school marks, approved by the Department of Education, showing necessary credits and grades for admittance to program desired

OR

A statement from the principal showing secondary school record to date. Please list all those courses, and their dates of completion, which you are currently taking or plan to take before coming to BCIT.

This statement must be substantiated by an official transcript when it becomes available. Photocopies are not acceptable. A photocopy will be acceptable only if the original document is submitted IN PERSON *for verification and photocopying by the Registrar's office.*

2) Official documents supporting other educational credits claimed in this application, i.e., university, college, vocational institute, etc.

3) In order to assist the selection procedure, you should submit additional relevant information on a separate sheet of paper.

4) Proof of Landed Immigrant Status or Student Authorization, designated to BCIT, if you are not a Canadian citizen.

5) Applications and documents are not maintained by the Institute for those applicants who are accepted and are unable to enroll, or for those candidates who have not been accepted. If making reapplication to BCIT, please contact the Admissions Office.

- For some programs, a medical questionnaire must be completed and medical fitness determined prior to final acceptance. Applicant will be informed at a later date as to the action to be taken.
- For Full-Time Program fee information, refer to the fee schedule listed in the BCIT Calendar.
- Refer to BCIT CALENDARS for detailed information.

- Please submit to: Office of the Registrar
  British Columbia Institute of Technology
  3700 Willingdon Avenue, Burnaby, B.C., Canada
  V5G 3H2

  Telephone 434-1610 Area Code 604

Surveying

The skills of the survey technologist are in demand in a large number of businesses and industries. Surveying and photogrammetry are essential to many phases of industrial and business development including construction, natural resource exploration and development, and mapping. Surveying techniques have become more sophisticated through the use of electronic devices and computers so that shape, size and location of objects or land masses can be determined with precision and speed.

Job Opportunities

Surveying firms, consulting engineers, the oil and gas industry, government mapping, highway, planning and engineering departments and utility companies provide some of the job possibilities for surveying graduates. Employment may be found throughout Canada and around the world. This program is accredited by the Applied Science Technologists and Technicians of B.C.

The Program

BCIT offers both two year and specialized one year programs. In conjunction with Continuing Education, the Survey department presents a training program to the Technician level. The major surveying program is the two year course of studies leading to a National Diploma in Surveying. Students in this program acquire a solid background in math, physics, cartography, photogrammetry, plane and geodetic surveying and computers. The practical skills of note keeping, drafting, field operations and calculations are also covered. Prospective students should have a genuine interest in mathematics, computers, earth sciences and should enjoy a vigorous outdoor lifestyle. Students desiring a less academic program may take advantage of the more field-oriented Junior Technician level program. Students who select this program will normally complete Term One of the General Survey program and then transfer into a specialized course of studies in applied survey techniques.

Students whose interests are centred in the areas of photography, computers and cartography, should consider the Photogrammetric Operators program. This program is a two term course of studies specializing in production photogrammetry. Employment in surveying during the summer break is considered desirable.

Post-graduation

Following completion of the two year diploma program, students are eligible for membership in the Applied Science Technologists and Technicians of BC. Graduates are granted some course credits at the University of Calgary in the Survey Engineering Department and at the University of New Brunswick and examinations set by the Western Canadian Board of Examiners for Land Surveyors' Association or Corporation of the four Western Canadian provinces.

Prerequisite

Algebra 12 and Physics 11 are course requirements for this program. Applicants should have a good understanding of math and physics to the university level. Good health is also important because of the physical demands of survey work. Photogrammetry Option students must have good stereo vision.

Faculty and Staff

R.I. McNeil, B.Surv., B.C.L.S., D.L.S., Dipl. Adult Ed., P.Eng., Department Head
K.Bracewell, Dipl.T.
R. Bremner, Dipl.T.
J.S. Caldwell
D.C. Deans, B.A., Program Head
K. Errington, B.C.L.S., Cert.Min.Surv., Senior Instructor
K.Frankich, Dipl.Ing., M.A.Sc., Ph.D.
K. Gysler, B.Eng., M.Eng., D.L.S., P.Eng. Chief Instructor
D. Jarvos, Dipl.T.
G. Kehoe, B.A.Sc., B.C.L.S.
D.S. Martens, Dipl.T., B.C.L.S.
R.G. Miller, Dipl.T., B.A.
W.A. Tupper, Dipl.Ing.
N. Wong, Dipl.Ing., A.R.I.C.S.

TECHNOLOGY: Surveying

PROGRAM: Surveying

Level 1

		Classroom hours per week
MATH 151	Basic Technical Mathematics	7.0
MECH 101	Drafting Fundamentals	3.0
PHYS 123	Physics	5.0
SURV 161	Plane Survey Computations 1	3.0
SURV 164	Field Survey 1	8.0
SURV 172	Computer Applications 1	2.0
TCOM 111	Technical Communication	3.0

Level 2

		Classroom hours per week
MATH 251	Calculus	7.0
MECH 203	Drafting	2.0
PHOT 267	Photogrammetry 2	3.0
PHYS 223	Physics	3.0
SURV 261	Plane Survey Computations 2	3.0
SURV 264	Field Survey 2	8.0
SURV 265	Survey Drafting	1.0
SURV 272	Computer Applications 2	2.0
TCOM 212	Technical Communication	3.0

Level 3

		Classroom hours per week
MATH 351	Matrix Methods	4.0
PHOT 367	Photogrammetry 3	2.0
SURV 361	Plane Survey Computations 3	2.0
SURV 362	Geodetic Surveying 1	3.0
SURV 363	Adjustments of Surveying Measurements	3.0
SURV 364	Field Survey 3	7.0
SURV 365	Drafting and Survey CAD	2.0
SURV 367	Earth Sciences	3.0
SURV 368	Descriptions and Survey Law	2.0
SURV 372	Computer Applications 3	2.0

Level 4

		Classroom hours per week
MATH 451	Statistics	4.0
PHOT 467	Photogrammetry 4	3.0
SURV 461	Plane Survey Computations 4	2.0
SURV 462	Geodetic Surveying 2	4.0
SURV 463	Mathematical Cartography	3.0
SURV 464	Field Survey 4	6.0
SURV 465	Survey CAD 2	3.0
SURV 468	Cadastral Surveying	2.0
SURV 469	Planning and Land Utilization	2.0
SURV 474	Field Surveying for Photogrammetry Option	2.0

PROGRAM: Technician's Program

		Classroom hours per week
MECH 203	Drafting	2.0
PHOT 267	Photogrammetry 2	3.0
SURV 260	Computational Methods for the Field Technician	5.0

SURV 265	Survey Drafting	1.0
SURV 268	Field Survey Techniques	13.0
SURV 272	Computer Applications 2	2.0
TCOM 121	Technical Communication	3.0

PROGRAM: Photogrammetry

Level 3

		Classroom hours per week
MATH 351	Matrix Methods	4.0
PHOT 365	Cartography — Photogrammetry	2.0
PHOT 377	Photogrammetry	11.0
SURV 361	Plane Survey Computations 3	3.0
SURV 362	Geodetic Surveying 1	3.0
SURV 363	Adjustments of Survey Measurements	3.0
SURV 372	Computer Applications 3	2.0
SURV 374	Field Surveying	3.0

Level 4

		Classroom hours per week
MATH 451	Statistics	4.0
PHOT 465	Cartography — Photogrammetry	3.0
PHOT 477	Photogrammetry	10.0
SURV 461	Plane Survey Computations 4	2.0
SURV 462	Geodetic Surveying 2	4.0
SURV 463	Mathematical Cartography	3.0
SURV 469	Planning and Land Utilization	2.0
SURV 474	Field Surveying	3.0

Course Descriptions

MATH 151 Basic Technical Mathematics — Quadratic equation and systems of linear equations. Trigonometric functions of any angle, solution of triangles, graphs of trigonometric functions, identities, and trigonometric equations. Celestial mechanics and angular measures. Definitions and theorems from solid geometry, solutions of spherical triangles and problems in navigation. The straight line, conic sections and transformation of coordinates.

MATH 251 Calculus — Limits, the derivative, differentiation rules for algebraic, trigonometric, inverse trigonometric, logarithmic and exponential functions; curve sketching, related rates, differentials and radius of curvature. Partial differentiation, Taylor and Maclaurin series and Puissant's theorem. Least squares theory. Antidifferentiation, the indefinite integral and the definite integral including area, volume and ARC length. Integration by parts, partial fractions and substitution techniques.

MATH 351 Matrix Methods — Matrix theory and its application in surveying focussing on the elements of matrix operations used in least squares adjustments. Included are vectors and coordinate transformations, matrix calculus, eigenvalues and eigenvectors, quadratic forms and ellipses.

MATH 451 Statistics — Organization and graphical presentation of data, frequency distributions and measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation, propagation of error, preanalysis, regression and correlation, and the use of variance/covariance matrix.

MECH 101 Drafting Fundamentals — An introductory course for persons with little or no experience in graphics. (Students are required to purchase drafting equipment and supplies on the first night of class) Students learn to produce and read simple drawings. Topics include scales, geometric constructions, basic orthographics detail interpretation, line visibility, dimensioning, auxiliary views, true shape, inclined and skew surfaces, sections, pictorials, working drawings and freehand skteches.

MECH 203 Drafting — Techniques in ink; intersections and developments; contours; profiles; rights-of-way; survey problems and projects.

PHOT 267 Photogrammetry 2 — Introduction to aerial photographs and other remote sensing acquired data; use of map and air photo; geometry of the air photo (scale, displacement and parallax); optics for photogrammetry (refraction, reflection, prisms and lenses); stereoscopy and stereoscopes; radial line triangulation and planimetric map compilation; aerial cameras.

PHOT 365 Cartography — Photogrammetry — Drafting principles as applied to photogrammetric compilation and cartography; inking and scribing techniques; surround detail, lettering and scales; production procedures.

PHOT 367 Photogrammetry 3 — The compilation of a flight plan and detailed specifications for a photogrammetric project; photographic measurements and refinements using a comparator and other instruments; the elements of exterior orientation expressing the space position and angular orientation of a tilted photograph; use of direct optical projection sterioplotters; sterioplotters with mechanical or optical mechanical projection systems and automated stereo plotting instruments; application of on- and off-line projection systems and automatic contouring during orthophotoproduction; the location of points by intersection from two or more terrestrial photographs.

PHOT 377 Photogrammetry — The geometry and physical nature of the photograph; optics for photogrammetry; principles of photography; dark room procedures; aerial cameras; stereoscopy; the spatial model; comparator measurements of photocoordinates; planning aerial photography; plotting instruments; classification and operation of stereoplotters; aerial triangulation; photogrammetric control extension, coordinate tranformation; use of electronic computers; photo-interpretation; terrestrial and oblique photogrammetry; map compilation; cartography; remote sensing; photogrammetric refinement; general specifications.

PHOT 465 Cartography — Photogrammetry — Drafting principles as applied to photogrammetric compilation and cartography; inking and scribing techniques; surround detail, lettering and scales; production procedures.

PHOT 467 Photogrammetry 4 — Review of geometric projections, inner, relative and absolute orientation. Three dimensional similarity transformation, projective transformation, collinearity transformation, projective transformation, collinearity and coplanarity equations. Restitution instruments — analog and analytical types. Accuracy of photogrammetric measurement. Aerial triangulation. Photogrammetric products — topographic maps. Orthophoto maps and digital elevation models (DEM).

PHOT 477 Photogrammetry — Coordinate transformations; colinearity and coplanarity equations; accuracy of coordinate determination; aerial triangulation — preparation, measuring and adjustment; applications of photogrammetry to survey and mapping projects; introduction to digital mapping.

PHYS 123 Physics — General topics covered include light and optical instruments, kinematics, statics, dynamics, angular motion, energy, work properties of matter, temperature, thermal properties of matter, wave motion, basic electricity and magnetism and electronic distance measuring. The lab program stresses measurement, data analysis, experimental investigation of physical laws and technical report writing. Mathematical treatment requires only algebra and trigonometry. Applications of the general topics are relevant to the Surveying Technology.

PHYS 223 Physics — see PHYS 123.

SURV 161 Plane Survey Computations 1 — Mathematical basics; geometry and theorems pertaining to circles; plane trigonometry; angles and bearings; definitions and conversions of angles to bearings and vice versa; coordinate systems; polar and rectangular; inversing; computations of traverses; traverse adjustment by compass and transit rules; locations of gross linear and angular gross errors; area computations by coordinate and DMD methods; UTM traverse computations; missing parts; see SURV 261.

SURV 172 Computer Applications 1 — This course is designed to familiarize the student with the operation of the hand held computer from two perspectives: first, as a calculator to do random computations; second, as a programming tool to solve routine survey problems. Material covered: modes of operation, operator hierarchy, numeric functions, numeric and string variables, array variables, basic statements and commands, program structure, elementary programming and program editing.

SURV 260 Computational Methods for the Field Technician — Review of important geometry theorems and their application to survey. Computations of simple circular curves, and symmetric vertical curves. The solution of problems related to the subdivision of land. The reduction of field acquired measurements.

SURV 261 Plane Survey Computations 2 — Missing parts: different techniques of computations problems on subdivision of land; prismodal and trapezoidal rules of area computations; geometry and elements of circular and compound curves; various methods of curve layout; vertical curve; calculations of areas of cross-sections and earthworks volumes; slope staking; control surveys: intersection and resection; inaccessible base.

SURV 264 Field Survey 2 — An extension of SURV 164 Field Survey 1. Students use techniques developed in large field project where further instrumentation in the form of tacheometers, electronic distance measuring equipment is used.

SURV 265 Survey Drafting — Completion of this course will give students the ability to apply drafting fundamentals to the solution of survey problems. Students will acquire skills in: plotting cadastral survey data; drafting plans, profiles and cross-sections; developing simple earth-work diagrams.

SURV 268 Field Survey Techniques — This is an intensified field oriented course. Successful completion will give students the ability to carry-out routine survey tasks. These will include extensive practice in the use of surveyor's levels, theodolites and various types of EDMs.

SURV 272 Computer Applications 2 — A continuation of SURV 172. Topics include BASIC programming for strings, for-next loops, subroutines, data files, introduction to MS-DOS, introduction to word processing, serial communication for hand held computers.

SURV 361 Plane Survey Computations 3 — Geometric spaces in surveying, surveying measurements, propagation of errors, computers and numerical approaches in surveying; computations of control surveys; triangulation, trilateration, traversing, reduction of eccentric measurements, intersection, resection, inaccessible base; transformation of coordinates, partitioning of land, horizontal and vertical curves; integrated surveying; deformations; three dimensional surveying systems.

SURV 362 Geodetic Surveying 1 — Properties of the ellipse and the ellipsoid of revolution; calculation of radii of curvature; spherical excess; Legendre's theorem, method of addends. Field tests; triangle closures, side equations, sine consistency checks; reduction to sea level. Convergence of meridians, computation of geodetic position, foreward and inverse. Trigonometric levelling; reciprocal, non-reciprocal, refraction, intervisibility problems.

SURV 363 Adjustments of Survey Measurements — Definitions and classification of errors, measures of precision; propagation law of standard errors; weights and propagation of weights; principle of least squares (in matrix notation); adjustment by variation of parameters; conditional observations; combined adjustments; adjustments of triangulation, trilateration nets, and traversing.

SURV 364 Field Survey 3 — This course introduces the student to the instruments and methods used in carrying out plane and geodetic surveys. The projects are aimed at engineering, hydrographic, mining, legal and precise surveys. The student is introduced to the reduction and presentation of the field data, with the application of computers in some areas.

SURV 365 Drafting and Survey CAD — Topics covered include sequential files, string manipulation, microcomputer graphics, role of CAD in surveying, BASIC and FORTRAN programming for plotters and digitizers, data collector transfers, reduction of field data, coordinate goemetry programs, creation of plot files. Surveyor general requirements for survey plans, inking.

SURV 367 Earth Sciences — A study of the forest flora of British Columbia; the characteristics of native trees, their identifying features and common uses. Elementary geology, including the study of rocks and minerals, geologic structures, general location and uses of common ores. Soil classification and location.

SURV 368 Descriptions and Survey Law — This course covers basic Survey Law, land tenure and land registration systems. Land survey systems are examined and the format of descriptions for deeds is outlined--the use of metes and bounds descriptions, together with adjoiners, aliquot parts, centre line descriptions are developed.

SURV 372 Computer Applications 3 — Students will study the FORTRAN language and achieve a moderate proficiency in writing programs for survey computations and graphics. Topics include features of the IBM mainframe, CMS terminal operating systems, XEDIT (Editing Utility), use of the WATIV compiler, fundamentals of the FORTRAN language, FORTRAN 77 compiler, CALCOMP calls, file handling and transfers, IBM PC, FORTRAN compilers.

SURV 374 Field Surveying — Control surveys by triangulation, trilateration and traversing; indirect optical distance measurement; electro-magnetic distance measurements; the gyro-theodolite; trigonometrical and barometric levelling.

SURV 461 Plane Survey Computations 4 — see SURV 361.

SURV 462 Geodetic Surveying 2 — Gravitational and centrifugal force; gravity, gravity measurements and reductions, anomalies, separation of the geoid; precise levelling, orthometric and dynamic heights. Close satellite theory, spherical and rectangular coordinate systems, Doppler positioning by satellite, electronics in surveying, propagation of electromagnetic waves, refraction. B.C. system of integrated surveys, computations in the UTM system, zone to zone transformations.

SURV 463 Mathematical Cartography — Concepts and properties of maps; classifications of maps; theory of distortions; conformality; equivalency; Tissot's indicatrix, conical projections; cylindrical projections; perspective projections; polyconic projection of British Columbia; UTM projection; stereographic projection of New Brunswick.

SURV 464 Field Survey 4 — see SURV 364.

SURV 465 Survey CAD 2 — Topics covered include: data structures, programming for digitizers and plotters, introduction to computer graphics, and algorithms for computer cartography.

SURV 468 Cadastral Surveying — Deals with surveys which do not have to account for curvature of the earth. Analysis of methods and instrumental errors, use of specialized equipment. Application of survey methods to engineering surveys, mining surveys, hydrographic surveys, legal surveys and higher order surveys.

SURV 469 Planning and Land Utilization — The planning process as it applies to regional and community planning; the role of various planning authorities and their powers; legislation effecting planning; zoning and its implication for land use and land development; land use studies; the subdivision of land and elementary economics related to land development.

SURV 474 Field Surveying — see SURV 374.

TCOM 111 Technical Communication — In this course, students learn the style and organization of clear technical writing. They write letters and memos, process descriptions and instructions, and design graphics relevant to surveying. They also give an oral report.

TCOM 121 Technical Communication — Under development.

TCOM 212 Technical Communication — In this course, students learn the fundamentals of job seeking, meeting and reporting. They participate in meetings and give an oral technical report. They write resumés, job application letters, technical briefs and proposals and occurrence, trip progress, evaluation and recommendation reports. Prerequisite: TCOM 111.

Natural Resource Studies

Biological Sciences

The Biological Sciences Technology, offers a variety of secure and worthwhile career possibilities encompassing indoor and outdoor work in large or small-scale settings. Food processing offers stable employment, even during unsettled economic conditions, since this industry is tied to population growth. Those with a concern for their environmental surroundings, may gravitate towards landscape horticulture. Others may be interested in mastering the complexities of farm management.

The Program

The first term of the Biological Sciences Program provides students with a general background before they proceed to one of two options: Food Processing or Landscape Horticulture. All programs and options in the Biological Sciences Technology are accredited by the Applied Science Technologists and Technicians of B.C.

Note: The second year of Food Production and Management in Agriculture programs will be offered in 1986/87 but not offered in subsequent years.

Job Opportunities

Graduates in the *Food Processing Option* find employment in the food manufacturing industry, where they may perform chemical, physical and bacteriological tests on food materials during processing and on packaged goods, or they may supervise manufacturing processes within the plant. Other opportunities are found in government laboratories and inspection services.

Landscape Horticulture Option graduates are employed with landscape contractors, greenhouses, nurseries, parks and recreation systems, landscape architects and planners.

Prerequisite

Algebra 12 and Chemistry 11 are course requirements for the Biological Sciences Program (Food Processing, Landscape Horticulture).

Faculty and Staff

J.T. Neilson, B.A.Sc., P.Eng., Acting Department Head
S.B.J. Andersen, B.A., Chief Instructor
R.S. Berry, B.S.A., P.Ag.
K.G. Cummings
J.T. Gillingham, B.S.A., M.Sc., Ph.D.
R.N.E. Hargreaves, Dipl.T., A.S.E.T.
R.N. Hitchman, B.S.A., P.Ag.
W. Hooge, B.S.A., P.Ag., Chief Instructor
V.J. Martens, B.S.A., M.Sc., P.Ag., Chief Instructor
J.H. Muir, B.S.A., P.Ag.
S.M. Murray, B.Sc. (Agr.), P.Ag.
B.E. Rothe
J.K. Soutter, H.D.F.T.

TECHNOLOGY: Biological Sciences

PROGRAM: Food Production

Level 3		Classroom hours per week
BISC 300	Agricultural Field Studies	-
BISC 304	Introductory Food Analysis	5.0
BISC 305	Mechanics of Machines	4.0
BISC 307	Applied Genetics	4.0
BISC 308	Plant Technology	6.0
BISC 309	Animal Technology	4.0
CHEM 311	Instrumental Analytical Methods	5.0
TCOM 303	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
BISC 407	Agricultural Analysis	5.0
BISC 408	Experimental Techniques	4.0
BISC 409	Agricultural Mechanics	5.0
BISC 410	Plant Protection	6.0
BISC 411	Soil Technology	5.0
MATH 444	Introduction to Computing	2.0
MKTG 419	Agricultural Product Marketing	3.0

PROGRAM: Landscape Horticulture

Level 1		Classroom hours per week
BISC 102	Introductory Microbiology	6.0
BISC 103	Biology	5.0
CHEM 103	Applied Chemical Principles 1	6.0
MATH 144	Basic Technical Math	5.0
PHYS 102	Physics for Biological Sciences	5.0
TCOM 105	Technical Communication	3.0

Level 2		Classroom hours per week
ADMN 110	Management	3.0
BISC 205	Introductory Botany and Soils	6.0
BISC 206	Horticulture 1	5.0
BLDG 117	Landscape Drafting	3.0
CHEM 217	Applied Chemical Principles	3.0
PHYS 202	Physics	5.0
SURV 125	Introduction to Survey	3.0
TCOM 205	Technical Communication	3.0

Level 3		Classroom hours per week
BISC 306	Horticulture 2	6.0
BISC 310	Landscape Mechanics	5.0
BISC 311	Nursery Crop Production	6.0
BISC 312	Landscape Techniques	5.0
BISC 313	Advanced Plant Identification	3.0
BLDG 217	Landscape Drafting	3.0
TCOM 303	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
BISC 410	Plant Protection	6.0
BISC 411	Soil Technology	5.0
BISC 412	Landscape Techniques	6.0
BISC 413	Landscape Field Practices	6.0
BISC 414	Supervisory Practices	4.0
BISC 417	Silviculture and Forest Nurseries	4.0
CIVL 442	Land Engineering	3.0

PROGRAM: Food Processing

Level 1		Classroom hours per week
BISC 102	Introductory Microbiology	6.0
BISC 103	Biology	5.0
CHEM 103	Applied Chemical Principles 1	6.0
MATH 144	Basic Technical Math	5.0
PHYS 102	Physics	5.0
TCOM 105	Technical Communication	3.0

Level 2		Classroom hours per week
BISC 201	Food Processing	6.0
BISC 202	Microbiology for Food Processing	5.0
CHEM 203	Applied Chemical Principles 2	6.0
MATH 244	Statistics 1 and 2	5.0
PHYS 202	Physics	5.0
TCOM 205	Technical Communication	3.0

Level 3		Classroom hours per week
BISC 301	Food Processing	5.0
BISC 302	Nutrition for Food Processing	2.0
BISC 303	Quality Control	4.0
BISC 304	Introductory Food Analysis	5.0
BISC 305	Mechanics of Machines	5.0
OPMT 163	Management Engineering 1	3.0
TCOM 303	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
ADMN 110	Management	2.0
BISC 401	Food Processing	5.0
BISC 402	Process Analysis	5.0
BISC 403	Quality Control	2.0
BISC 404	Food Analysis	5.0
BISC 405	Enzymatic Analysis	2.0
BISC 406	Sanitation	4.0
ELEC 253	Instrumentation for Biological Sciences	3.0
MATH 444	Introduction to Computing	2.0

PROGRAM: Agri-Management

Level 3		Classroom hours per week
BISC 300	Agricultural Field Studies	1.0
BISC 305	Mechanics of Machines	4.0
BISC 307	Applied Genetics	4.0
BISC 308	Plant Technology	6.0
BISC 309	Animal Technology	4.0
BISC 314	Agri-Business Law and Taxes	3.0
BISC 315	Agri-Business Organization and Management	5.0
BISC 316	Agri-Business Finance and Appraisal	3.0
BISC 317	Summer Technical Report	1.0

Level 4		Classroom hours per week
ADMN 340	Personnel Administration	3.0
BISC 409	Agricultural Mechanics	5.0
BISC 410	Plant Protection	6.0
BISC 411	Soil Technology	5.0
BISC 415	Agri-Business Organization and Management	5.0
BISC 416	Crop and Livestock Management	4.0
OPMT 163	Management Engineering 1	2.0

Course Descriptions

ADMN 110 Management — Management is intended to give students an appreciation of the application of management principles and business techniques. Students are given an opportunity to develop their skills in using lecture material by analyzing typical business problems and proposing and discussing feasible problem solutions. Subjects covered include planning, organizing, leadership, control and financial management.

ADMN 340 Personnel Administration — An introduction to the fundamentals of personnel management including organization of the personnel function, salary administration, fringe benefits, training, management development and performance appraisal, constructive discipline, grievances and morale.

BISC 102 Introductory Microbiology — Designed to train students in the basic microbiological procedures employed in a laboratory: use and care of the microscope, staining methods, aseptic techniques, methods of identifying micro-organisms.

BISC 103 Biology — A study of the principles underlying living phenomena including the organizational attributes of living matter. Evolutionary development is traced from one-celled organisms to higher plants and animals. The economic importance of various classes of plants and animals is included.

BISC 201 Food Processing — An introduction to the principles and processes of canning, freezing, dehydrating and fermentation of foods. The use of salt, sugar and additives to preserve food. The importance of packaging of foods. Experimental portions of food will be preserved by various methods during lab periods. Prerequisite: BISC 102, CHEM 103.

BISC 202 Microbiology for Food Processing — The application of microbiology to food manufacturing. The isolation of microorganisms significant to food processing for the purposes of differentiation and classification. Maintaining high bacteriological standards in processed foods. Shelf-life studies, spoilage control, food fermentations. Assessing microbiological test results and report writing to management. Prerequisite: BISC 102.

BISC 205 Introductory Botany and Soils — Plant morphology and physiology, with particular reference to ornamental and horticultural plants, soil types and introduction to soil testing. Culture and management of ornamental and recreational turf grass. Prerequisite: BISC 103.

BISC 206 Horticulture 1 — The principles of environmental control and plant response. Basic greenhouse and plant propagation techniques. Principles of plant taxonomy and nomenclature. Recognition and use of woody species found in the landscape. Prerequisite: BISC 103.

BISC 300 Agricultural Field Studies — A study of agricultural operations unique to the southern interior of B.C. A written report is required.

BISC 301 Food Processing — The study of food manufacturing processes in the fish, meat, fruit and vegetable, cereal, dairy, beverage and confectionery industries. Principles and techniques of proper handling and preservation of products in these industries will be emphasized. The use of ingredients such as sweeteners, flavorings, coloring and preservatives will be discussed. Prerequisite: BISC 201.

BISC 302 Nutrition for Food Processing — A study of the nutrients found in food, their importance, metabolic function and dietary requirements. The selection of diets to meet varied nutritional needs. The relationship of nutrition and health. Nutritional labelling. The effect of processing on the nutritional quality of foods. Prerequisite: CHEM 103, CHEM 203.

BISC 303 Quality Control — An assessment of food quality. Responsibilities and organization of a quality control department in the food industry. Statistical procedures for sampling. Federal and provincial government regulations. An introduction to tristimulus colorimetry and measurement of color in foods. Prerequisite: MATH 244.

BISC 304 Introductory Food Analysis — An introduction to the theoretical and practical aspects of sampling and sample preparation. The proximate analysis of foods and livestock rations. An

introduction to carbohydrate and protein chemistry with selected analyses, using the best equipment available. Prerequisite: CHEM 103, CHEM 203.

BISC 305 Mechanics of Machines — Basic mechanical principles of food processing and agricultural equipment including mechanical power transmission, electrical power, fluid systems and heat transfer. Materials of construction and equipment lubrication. The application of microcomputers to food processing and agriculture systems. Prerequisite: PHYS 102, PHYS 202.

BISC 306 Horticulture 2 — The diverse methods of plant propagation are covered including seed collection, extraction and stratification. Seed bed preparation and growing media. Asexual propagation of selected species by cuttings, grafting and budding. Micropropagation and tissue culture. Hydroponic culture systems. Prerequisite: BISC 205, BISC 206.

BISC 307 Applied Genetics — Principles of genetics, including heredity and environment; Mendel's law of segregation, expression and interaction of genes and multiple factor inheritance; applied plant breeding and animal breeding.

BISC 308 Plant Technology — Plant environment and control. Plant processes and their manipulation in commercial crop plants. Application of various plant culture techniques in crop production, with reference to representative cereals, forages, vegetables, small fruits and tree fruits grown in British Columbia.

BISC 309 Animal Technology — A general familiarization with the livestock and poultry industries as they relate to food production. Animal physiology. Role of basic nutrients in metabolism. Nutritive requirements of livestock during growth, reproduction and lactation. Feed ration formulation. Feed additives.

BISC 310 Landscape Mechanics — A study of basic engineering principles as applied to landscape construction and maintenance equipment, irrigation and drainage systems, nursery and greenhouse systems. The application of microcomputers to landscape and greenhouse systems. Prerequisite: PHYS 102, PHYS 202.

BISC 311 Nursery Crop Production — Field and container culture of nursery plants. Nursery stock specifications. Site selection and layout. Growing structures and equipment. Prerequisite: BISC 103, BISC 206.

BISC 312 Landscape Techniques — History and principles of landscape design. Inventory of client requirements. Site analysis. Preparation of working drawings, bidding and contract documents.

BISC 313 Advanced Plant Identification — A continuation of the plant identification studies begun in Horticulture 1, with particular reference to the species and cultivar level. The use of plants in the landscape. Students must present a plant collection as part of the course requirement. Prerequisite: BISC 103, BISC 206.

BISC 314 Agri-Business Law and Taxes — Major aspects of law and taxation as they affect agricultural producers and supply and support businesses. Property and income taxes, estate planning, laws of contract. Federal and provincial laws affecting agriculture in areas such as labor and expropriation. How to obtain and analyze information in the fields of law and taxation.

BISC 315 Agri-Business Organization and Management — Business organization methods used by farm and agricultural businesses. Management applications in agriculture: goal setting, planning, resource acquisition, staffing coordinating, controlling, monitoring the operation. Use will be made of available farm business management programs. Computer applications in agriculture. Applying knowledge in many areas to learn effective decision making.

BISC 316 Agri-Business Finance and Appraisal — Capital and credit in farm business administration including sources of agricultural funds, analysis and appraisal of commercial farms, analysis of financial statements, discussion of financial controls on the farm and in related business, and the use of capital budgeting.

BISC 317 Summer Technical Report — Students prepare and present a technical report on a phase of agricultural management experienced during the 12-week practicum. Financial and decision making aspects are emphasized.

BISC 401 Food Processing — see BISC 301. Prerequisite: BISC 301.

BISC 402 Process Analysis — An analysis of the unit operations and equipment encountered in food processing. Operations involving raw and processed material are covered, as are plant systems including materials handling, waste management, plant layout and design, packaging equipment. Prerequisite: BISC 201, BISC 301, BISC 305.

BISC 403 Quality Control — The sensory evaluation of food; facility design, selection of taste panels; statistical analysis of data; laboratory measurement of consistency and texture of foods; recording and reporting with control charts; and evolutionary operations. Prerequisite: BISC 303.

BISC 404 Food Analysis — An introduction to the chemistry of fats and oils. Practical laboratory analysis of lipids, vitamins and minerals using the latest equipment available. Prerequisite: BISC 304, CHEM 311.

BISC 405 Enzymatic Analysis — An introduction to the use of enzymes to perform determination of a variety of food constituents with great sensitivity and specificity. This is a relatively new and promising analytical tool. A high quality, ultra-violet spectrophotometer is used in this course. Prerequisite: BISC 304, CHEM 311.

BISC 406 Sanitation — Microbial aspects of industrial sanitation. Properties of good detergents and sanitizers. Government regulation. The use and storage of toxic materials. Approved water supply. Industrial practicums. Prerequisite: BISC 102, BISC 202.

BISC 407 Agricultural Analysis — An introduction to the chemistry of fats and oils, with selected analyses of lipids. A practical training in soil analysis, plant analysis and fertilizer analysis using the latest equipment available.

BISC 408 Experimental Technology — Design and layout of experiments using typical biological subjects. The application of the scientific method and statistical methods. Recording and presentation of experimental data. Techniques in plant histology and microscopy.

BISC 409 Agricultural Mechanics — An analysis of the unit operations and equipment encountered in agriculture. Various systems including irrigation, drainage, field operations, crop protection, harvesting and animal systems will be discussed. Equipment components and selection of equipment will be analyzed.

BISC 410 Plant Protection — The morphology and identification of weeds, diseases and insects. Life histories of representative species. Strategy of control by cultural, biological and chemical means. Currently recommended pesticides are reviewed.

Pesticide safety, pest and pesticide legislation. Students are examined under the provisions of the "Pesticides Control Act" for pesticide applicator and pesticide dispenser certificates. Prerequisite: BISC 103 and CHEM 103 or CHEM 203 or CHEM 217.

BISC 411 Soil Technology — The origin, formation and classification of soils; use of survey reports, map interpretation. Components of soils, soil colloids, cation exchange, reactions, soil acidity, phosphorus, nitrogen, the crop as an indicator of fertility, soil organic matters, fertilizers. Soil-sampling procedures, extraction methods used in soil analysis. Prerequisite: BISC 204 or 205.

BISC 412 Landscape Techniques — see BISC 312. Prerequisite: BISC 312.

BISC 413 Landscape Field Practices — Arboricultural techniques and practices. Pruning, transplanting, tree values, maintenance schedules. Prerequisite: BISC 206, BISC 306, BISC 312, BISC 313.

BISC 414 Supervisory Practices — This course provides an understanding of effective supervisory practices and of organizational behavior. knowledge of labor laws, legal and tax information and government regulations is gained as well as management of resources for improved performance.

BISC 415 Agri-Business Organization and Management — see BISC 315.

BISC 416 Crop and Livestock Management — The principles involved in management of crops and livestock. Optimizing production through application of knowledge and analysis of alternatives. Livestock disease prevention, recognition and treatment. Knowledge of good production standards will be acquired.

BISC 417 Silviculture and Forest Nurseries — An introduction to silviculture as practised in B.C., with emphasis on artificial regeneration of disturbed sites using planting stock. A review of stock types used in the regeneration process, their characteristics and methods of production and an analysis of the field conditions under which each might be used. Prerequisite: BISC 103, BISC 206, BISC 306, BISC 311.

BLDG 117 Landscape Drafting — Fundamentals of drafting. Development of drafting skills using projects based on landscape structural details, such as concrete slabs, steps, retaining walls and planters, as well as wood benches, fences and walls.

BLDG 217 Landscape Drafting — Continuation of BLDG 117. Further development of drafting skills, using projects based on masonry, post and beam, and concrete deck construction.

CHEM 103 Applied Chemical Principles 1 — An introductory course of basic inorganic chemistry, topics include: chemical bonding, stoichiometry, formula writing, solution preparation, oxidation and reduction, acid-base theory, titration calculations and buffer solutions. Laboratory exercises consist of qualitative and quantitative analysis. Good laboratory techniques are emphasized.

CHEM 203 Applied Chemical Principles 2 — A continuation of CHEM 103. Topics include theory of gravimetric and volumetric analysis, simple physical chemistry and organic chemistry. Selected organic topics such as carbohydrates, fats and oils which are applicable to the bio-science technology are discussed in detail. Laboratory exercises consist of quantitative and qualitative analysis and organic separations. Prerequisite: CHEM 103.

CHEM 217 Applied Chemical Principles — A continuation of CHEM 103 with emphasis on application to landscape horticulture. Topics discussed include soil chemical structures, ion-exchange, PH, solubility and redox effects, soil amenders, fertilizers and pesticides. Basic organic chemistry is introduced. Prerequisite: CHEM 103.

CHEM 311 Instrumental Analytical Methods — Deals with instrumentation used for chemical analysis. The theory, construction, application and operation of instrumentation is discussed. Instrumentation for the following is covered: potientiometry, polarography, refractometry, polarimetry, visible, ultra-violet, infra-red spectrophotometry, emission and absorption, flame photometry, gas and liquid chromatography. Laboratory exercises involve use of these instruments. Prerequisite: CHEM 203.

CIVL 442 Land Engineering — An introduction to the behavior of earth and land surfaces and engineering materials under various natural conditions. Included are foundation loads, settlements and bank stability of various soil types and the occurrence and flow of water under and above ground. By means of a project, the student learns to assess runoff flows through hydrological methods, designs a retaining dam for a recreational site complete with inlet and outlet flood-control structures, and estimates quantities for construction purposes.

ELEC 253 Instrumentation for Bio Sciences — An orientation course for the food processing option covering the principles and practices of instrumentation, measurement of pressure, level, temperature and flow and an introduction to negative feedback and automatic control systems.

MATH 144 Basic Technical Mathematics — Exponential/logarithmic theory and transformations, common and natural logarithms, logarithmic/semilogarithmic graphs. Variation, straight line equation, curve fitting. Delta-process, the derivative, differentiation rules, curve sketching, applied maxima/minima, the differential, anti-derivatives, indefinite integral, definite integral with area under a curve. Introduction to computing using BASIC.

MATH 244 Statistics 1 and 2 — Organization and graphical presentation of data, frequency distributions and measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Method of least squares, regression and correlation including related estimation and hypothesis tests.

MATH 444 Introduction to Computing — BASIC formatted output, arrays, subroutines, plot routines and files. Spreadsheets and case study.

MKTG 419 Agricultural Product Marketing — An overview of marketing functions as used in all levels of food production and distribution.

OPMT 163 Management Engineering 1 — The techniques of management problem-solving and work simplification, with particular application to engineering and industrial organization. Includes method study, some measurement technique, layout, planning and scheduling. The course emphasizes practical applications to the field of biological sciences.

PHYS 102 Physics — An introductory level course covering a wide range of physical principles, with emphasis on areas of popular interest and special relevance to the biological sciences technology. Topics covered in first term include kinematics, dynamics, friction, statics, energy, power, circular motion, momentum, elasticity and fluid mechanics. Topics covered in second term include temperature, heat, calorimetry, kinetic theory, heat transfer, basic electricity and magnetism, colorimetry, optics relativity and radiation. Measurements, data analysis, experimental techniques and report writing are stressed.

PHYS 202 Physics — see PHYS 102.

SURV 125 Introduction to Survey — Introduction to the theory of engineering survey, practical application of linear measurements, introduction to and theory of the theodolite, bearings and traverse computations, introduction to and theory of levelling, computation of areas and volume.

TCOM 105 Technical Communication — In this course, students learn the fundamentals of oral and written communication demanded by industry; how to organize technical information and plan and present oral reports. They write instructions, process descriptions and several types of technical letters and memos.

TCOM 205 Technical Communication — In this course, students apply the skills learned in the first term to write resumes, job application letters and occurrence, incident, inspection, field trip, progress, recommendation, comparison, feasibility, performance appraisal and evaluation reports. Prerequisite: TCOM 105.

TCOM 303 Advanced Technical Communication — In this course, students practice typical kinds of engineering communication such as persuasive and technical letters, incident and trip reports, proposals and executive summaries. They update resumes and job application letters and learn how to participate in meetings. Prerequisite: TCOM 105, 205.

Forest Resource

British Columbia's greatest renewable natural resource is its forest land. The benefits that derive from the intelligently planned use of this forest land are many, varied and extremely valuable to the people of this province. The wise use of the land and related resources is essential for the continued survival of many industries, as well as for the perpetuation of the resources themselves. The Forest Resource Technology has been established in an endeavor to meet the above needs and offers training in two options: *Forestry* and *Fish, Wildlife and Recreation.*

Job Opportunities

Graduates in the Forestry Option find employment in a variety of industrial and government positions.

The job opportunities for graduates in Fish, Wildlife and Recreation are principally in government agencies and, because of the limited number of jobs, the number of students is restricted.

The Program

Forestry covers forest engineering, logging systems and production, fire control, forest management, forest measurements, silviculture, photo interpretation and mapping, botany and soils, forest utilization and ecology.

Fish, Wildlife and Recreation covers the management of fish, wildlife and wildland recreation and includes habitat ecology, environmental inventory techniques and law enforcement with respect to the above-mentioned resources.

Prerequisite

* The following are minimum requirements: Algebra 11 (C+ average); a Science 11 (for F.W.R. option must be Biology 11); any one of another science 11, or a science or mathematics 12. Work experience in natural resources strengthens an application for either of the options. * Out of province and mature student applications will be reviewed by the Department Head.

Expenses

In addition to tuition fees, books, supplies and equipment, students will incur expenses for field trips and a first-aid course. These expenses may be as much as $300 for first year and $400 for second year.

Faculty and Staff

W.R. Cannon, B.A. Acting Department Head
N.E. Alexander, M.P.M.
M.R. Angelo, B.S.F., M.F.
D. Campbell, Dipl.T.
F. Cassetta, B.Sc.F., R.P.F.
C.W. Chestnut, B.A., Ph.D.
T.D. Chisholm, B.Ed.
E.C. Crossin, B.S.F., R.P.F.
C.J. Diebold, C.A.M., A.S.T.T.
D. Guthrie, B.Sc., M.Sc., Ph.D.
D.C. Holmes, B.A.Sc., M.F., R.P.F., P.Eng., Chief Instructor
E.W. Howard, B.S.F., M.F., Cert. Inst.
A.G. Jakoy, B.S.F., M.F., R.P.F., Chief Instructor
R. Kley, Dipl.T.
H. Lenko, B.S.F., R.P.F.
H. Lynum, B.A.Sc., R.P.F.
D.H. MacLaurin, B.S.F.
R.W. Reisen, Dipl.T. E.T.I., A.S.T.T.
N. Shaw, Dipl.T., A.S.T.T.
J. Simpson, B.Sc.F., M.Sc.
B. Sivak, B.S.F., M.F., Ph.D., R.P.F.
P. Willms, Dipl.T.
P. Yanciw, B.A.Sc.

TECHNOLOGY: Forest Resource

PROGRAM: Forestry

Level 1		Classroom hours per week
FSTR 101	Forest Measurements 1	5.0
FSTR 103	Plant Identification	5.0
FSTR 104	Photo Interpretation and Mapping 1	4.0
FSTR 105	Fire Management 1	3.0
FSTR 108	Natural Resource Uses	4.0
MATH 145	Basic Technical Mathematics for Forest Resources	6.0
TCOM 106	Technical Communication	3.0

Level 2		Classroom hours per week
FSTR 201	Forest Measurements 2	8.0
FSTR 202	Forest Soils Introduction	4.0
FSTR 203	Ecology	5.0
FSTR 204	Photo Interpretation and Mapping 2	4.0
FSTR 206	Microcomputer Applications	3.0
MATH 245	Mathematics for Forest Resources	4.0
TCOM 206	Technical Communication	3.0

Level 3		Classroom hours per week
FSTR 301	Forest Measurements 3	6.0
FSTR 302	Timber Harvesting	5.0
FSTR 303	Roads and Transportation 1	6.0
FSTR 304	Forest Pestology	4.0
FSTR 305	Silviculture 1	4.0
FSTR 306	Forest Administration	4.0
FSTR 311	Summer Technical Report	1.0
TCOM 304	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
FSTR 401	Forest Measurements 4	4.0
FSTR 402	Log Production and Cost Control	4.0
FSTR 403	Roads and Transportation 2	5.0
FSTR 404	Forest Pestology	4.0
FSTR 405	Silviculture 2	5.0
FSTR 406	Forest Management 2	4.0
FSTR 413	Independent Studies	3.0
FSTR 415	Fire Management 2	1.0
TCOM 402	Advanced Technical Communication	2.0

PROGRAM: Fish, Wildlife and Recreation

Level 1		Classroom hours per week
BISC 104	Zoology	5.0
FSTR 101	Forest Measurements 1	5.0
FSTR 103	Plant Identification	5.0
FSTR 104	Photo Interpretation and Mapping 1	4.0
FSTR 108	Natural Resource Uses	4.0
MATH 154	Basic Technical Mathematics for FWR	4.0
TCOM 209	Technical Communication	4.0

Level 2		Classroom hours per week
FSTR 202	Forest Soils Introduction	4.0
FSTR 203	Ecology	5.0
FSTR 204	Photo Interpretation and Mapping 2	4.0
FSTR 206	Microcomputer Applications	3.0
FSTR 207	Introduction to Fish, Wildlife and Recreation	4.0
MATH 254	Statistics for FWR	6.0
TCOM 308	Advanced Technical Communication	4.0

Level 3		Classroom hours per week
FSTR 306	Forest Administration	4.0
FSTR 307	Recreational Land Management	7.0
FSTR 308	Wildlife Management	7.0
FSTR 309	Fish Management 1	6.0
FSTR 310	Projects	6.0
FSTR 311	Summer Technical Report	1.0
TCOM 304	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
FSTR 407	Recreational Land Management	7.0
FSTR 408	Wildlife Management	7.0
FSTR 409	Fish Management 2	7.0
FSTR 410	Projects	5.0
FSTR 412	Law Enforcement	2.0
FSTR 413	Independent Studies	3.0
TCOM 406	Public Information Techniques	3.0

Course Descriptions

BISC 104 Zoology — General classification of the animal kingdom. Basic vertebrate zoology. The development of the vertebrate from embryo to adult. The study of the vertebrate body, including the skeletal, muscular, digestive, circulatory, urogenital and endocrine systems.

FSTR 101 Forest Measurement 1 — Fundamental concepts of forest engineering — measurement of distances, direction and elevation. Traverse calculations, obtaining, recording and plotting topographic detail. Care, maintenance and adjustment of equipment. This course is designed to familiarize the student with forest surveying methods used in logging layout and forest measurement.

FSTR 103 Plant Identification — The structure, physiology, taxonomy and uses of plants, with emphasis on those having important biological and economic significance in the biotic zones of B.C. Introduction to reproduction of plants with particular emphasis on conifers. Recognition and evaluation of common plants in forest, range land and alpine habitats of British Columbia and their uses in land management practices.

FSTR 104 Photo Interpretation and Mapping 1 — Practical use and application of aerial photography in natural resources. Classification, reconnaissance, planning and inventory using aerial photos. Practice in the use of stereometers. Construction of forest maps and plans. Transfer of detail from aerial photos using Map-O-Graph, Kail plotters and pantographs. Drafting and map reproduction techniques.

FSTR 105 Fire Management 1 — Historical review of fire behavior simulated to show the effects of topography, fuel and weather conditions. Pre-suppression, including fire-danger ratings, detection, reporting and general preorganization of industrial and government agencies. "Forest Act", Part XI. Fire suppression techniques through fire simulation and prescribed burning training in initial action and problem-solving.

FSTR 108 Natural Resource Uses — An introduction to the natural resources of British Columbia and their management needs, the agencies and organizations for resource management. The meaning of professionalism and the role of the technologist in the use of our natural resource. A review of the forest industry in British Columbia and its importance.

FSTR 201 Forest Measurement 2 — Methods of measuring standing and felled timber. Direct measurement of tree diameters, heights and ages. Characteristics and uses of standard volume tables. Construction of local volume tables. Types of sampling and design. Application of aerial sampling and point sampling with elementary statistical analysis. Compilation methods for sample data. Report writing. Prerequisite: FSTR 101.

FSTR 202 Forest Soils Introduction — Introduces students to soil formation, soil as foundation and soil as a medium for plant growth. Covers the properties of soils, texture, structure and water retention. Introduces students to the soils and landscapes of British Columbia Those students studying for credit must be prepared to take a one day field trip during the term and a weekend field trip at the end of the term. Students must be prepared to provide their own transportation (car pools).

FSTR 203 Ecology — Provides students with background information on and an understanding of the important uses of forest land. The course covers those resources associated with forest land and the problems of administration, management, multiple use and utilization. The principal resources considered are forests, fish, wildlife, range land, water, recreation and minerals. The course also covers ecology, from two main viewpoints: ecological principles first and the practical application of these principles to renewable resource management second. Examples are drawn from current environmental issues. Prerequisite: FSTR 103.

FSTR 204 Photo Interpretation and Mapping 2 — see FSTR 104. Prerequisite: FSTR 104.

FSTR 206 Microcomputer Applications — Introduction to computers and their applications to various forestry, fish, wildlife and recreation requirements.

FSTR 207 Introduction to Fish, Wildlife and Recreation — Basic identification of various fish and wildlife and their importance and interaction with other natural resources.

FSTR 250 Ecology — Introduces students to the basic concepts and terminology of ecology. Develops an appreciation for the components of ecosystems including man and his activities; outlines the energy flow in and introduces management aspects of numerous eco-systems. Students learn to identify numerous eco-systems of terrestrial and aquatic environments, describe energy fixation transfer in them and recognize approaches to proper management. The material is presented in the form of lectures and tutorials. Approximately four field trips are held on Saturdays and Sundays in lieu of classroom sessions.

FSTR 251 Forest Measurement 2 — Familiarizes the student with advanced methods of forest timber volume measurement and calculation, and sampling and report compilation. Subjects include measurement of standing and felled timber, tree diameter, height and age; use of volume tables; construction of local volume tables; sampling types and design; aerial sampling, point sampling with elementary statistical analysis; compilation methods for sample data and report writing. Prerequisite: FSTR 151.

FSTR 301 Forest Measurement 3 — see FSTR 251. Prerequisite: FSTR 201.

FSTR 302 Timber Harvesting — Description and analysis of timber harvesting systems presently used on the British Columbia coast and in the interior. Techniques in the theory and application of logging layout. Environmental considerations in timber harvesting. Multiple land-use concepts. Woods safety.

FSTR 303 Roads and Transportation 1 — Truck road location, construction, maintenance and costing. Preparation of plans and profiles. Measurement of earth and rock work. Optimum road standards, culvert and simple logspan bridge design, construction and maintenance. Hauling costs. Log dumps, land sorting areas and booming grounds. Water transportation of logs.

FSTR 304 Forest Pestology — An integrated study of forest insect and disease problems. Basic life histories. The interactions of damage agencies in the forest. Improved cruise techniques related to insect and disease damage. Use of subject literature. Cooperation with authoritative government agencies. Prevention and control of damage. Measuring and reporting of insect and disease damage. Recognition of the currently important insects and diseases.

FSTR 305 Silviculture 1 — Foundations of forest management: site, stocking, spacing, forest yield, forest growth and regulation. Introduction to silviculture: forest regeneration, seed and stock procurement, principles of seed production and cone collection.

FSTR 306 Forest Administration — Many of the functions once performed by government agencies and industry in the natural resource field are now being contracted out. This course is designed for people interested in embarking on a career in service contracting to the natural resource industry. Upon successful completion of this course, the student will have a basic knowledge of small business planning, be able to read and understand financial statements, understand simple double-entry accounting principles, be able to project a business plan for entrepreneurial activities and develop estimates for contract work.

FSTR 307 Recreational Land Management — An introductory course in recreational land management. Development and recreational use of areas designed as natural parks. Survey of outdoor recreation, history and organization of agencies providing recreational activities in parks. Park development, planning and design. Practical exercises in site analysis, planning and design for specific uses. Park and natural history interpretation. Park operation and administration. Assessment and development of wildlife recreational areas both in and out of established parks. Recognition of recreational sites by aerial photo interpretation of land forms. Private and public programs in forest recreation. Land tenures and land acquisition for recreation. Wildland landscaping. Summer and winter sports area developments. Water-oriented activities, wild-land access problems and trail design. Mountaineering, search and rescue.

FSTR 308 Wildlife Management — The principles and practice of wildlife management, with particular reference to problems and procedures in British Columbia wildlife environments. Dynamics of wildlife populations. Methods of study. Harvesting. Regulations. Natural and artificial regulation of animal numbers. Diseases and parasites. The economics of wildlife, particularly in forest habitats. Extensive field study to support and extend lecture and lab material.

FSTR 309 Fish Management 1 — The biology of British Columbia fish, including anatomy, taxonomy, physiology, behavior and ecology. Management aspects of fisheries, including population dynamics, habitat evaluation and improvement, harvesting, pollution and fishery regulations. Labs deal with methodology as it applies to the above and much of the training in this regard will be done in the field. Emphasis throughout is on the British Columbia situation.

FSTR 310 Projects — Field application of cruising techniques and data compilation by computer. Cruise report preparation including recommendations for environmental considerations. Preparation of forest maps. Familiarization with British Columbia cruising systems. Inventory as opposed to operational cruising. Logging waste assessment. British Columbia log scale application to coastal and interior operations. British Columbia boardfoot rule. Weight-scaling.

FSTR 311 Summer Technical Report — A detailed report on a phase of resource management from first-hand experience or from approved library research.

FSTR 401 Forest Measurement 4 — Field application of cruising techniques and data compilation by computer. Cruise report preparation including recommendations for environmental considerations. Preparation of forest maps. Familiarization with British Columbia cruising systems. Inventory as opposed to operational cruising. Logging-waste assessment. British Columbia log scale applications to coastal and interior operations. British Columbia boardfoot rule. Weight-scaling. Prerequisite: FSTR 301.

FSTR 402 Log Production and Cost Control — Log production planning and scheduling. Production and cost control. Cost analysis. Contracts and contract logging. Woods organization. Industry and government relationships in logging particularly as related to development and management of the related resources. Logging research reports studied. Prerequisite: FSTR 302.

FSTR 403 Roads and Transportation 2 — see FSTR 303. Prerequisite: FSTR 303.

FSTR 404 Forest Pestology — see FSTR 304. Prerequisite: FSTR 304.

FSTR 405 Silviculture 2 — Site examination, analysis and prescriptions; site preparation, planning methods, evaluating artificial regeneration, methods application, contract, planting, costing and inspection; brush control methods and application; spacing methods and evaluation; conifer release, application; fertilization, methods and application. Prerequisite: FSTR 305.

FSTR 406 Forest Management 2 — Principles of integrated resource management; planning and administration; relationship of timber production to other forest land uses; structure and organization of a forest business and enterprise; sustained yield management planning and operations; determination of cut; stumpage appraisal.

FSTR 407 Recreational Land Management — see FSTR 307. Prerequisite: FSTR 307.

FSTR 408 Wildlife Management — see FSTR 308. Prerequisite: FSTR 308.

FSTR 409 Fish Management 2 — see FSTR 309. Prerequisite: FSTR 309.

FSTR 410 Projects — Special study seminars or projects designed to introduce students to current problems and solutions in resource management. Partial or complete involvement with potential employers will be encouraged. Prerequisite: FSTR 310.

FSTR 412 Law Enforcement — Deals with the many aspects involved in the interpretation and enforcement of legislative acts relating to the management of Canada's wildland resource. Among these are the "Fisheries Act"; "Parks Act" and the "Wildlife Act".

FSTR 413 Independent Studies — A block of about 90% of class time is provided for a student to choose, research and prepare a written report on a topic related to natural resources. The topic must be approved by the staff. The topic might be pursued individually or in a group.

FSTR 415 Fire Management 2 — see FSTR 105. Prerequisite: FSTR 105.

MATH 145 Basic Technical Mathematics for Forest Resources — Systems of measurement, mensuration, and trapezoidal and Simpson's rules. Angular systems, radian measure applications, trigonometric ratios and Sine/Cosine laws. Ratio, proportion and variation. Polynomials, formulae, functions and their graphs. Graphical linear programming. Vectors and applications. Introduction to descriptive statistics with histograms and ogives.

MATH 154 Basic Technical Mathematics for Fish, Wildlife and Recreation — Systems of measurement, mensuration, trapezoidal and Simpson's rules. Angular systems, radian measure applications, trigonometric ratios and Sine/Cosine laws. Ratio, proportion and variation. Polynomials, formulae, functions and their graphs. Graphical linear programming. Vectors and applications. Introduction to descriptive statistics with histograms and ogives.

MATH 245 Mathematics 2 for Forest Resources — Further descriptive statistics. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Estimation, hypothesis testing, count data analysis and stratified sampling analysis. Regression and correlation including related estimation.

MATH 254 Statistics Fish, Wildlife and Recreation — Organization and presentation of data, frequency distributions and measures of central tendency; variation, skewness and kurtosis. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Analysis of variance. Method of least squares, regression and correlation, and curve fitting. Some non-parametric statistics.

TCOM 106 Technical Communication — In this course students practice writing skills applicable to the forest resource industry. Instruction, claim, request and adjustment letters and process and mechanism descriptions are covered. They also practice technical library search techniques and oral briefings.

TCOM 206 Technical Communication — Students write incident, progress, comparison and formal, technical reports. They also write a proposal, resume and job application letter. They practice formal meeting, interview and research techniques and are exposed to word processing. Prerequisite: TCOM 106.

TCOM 209 Technical Communication — Introduces students to technical and scientific communication skills required for a career in FWR. They study the principles of effective technical communication, business and technical formats, correspondence, short reports and research techniques for fish, wildlife and parks management topics.

TCOM 304 Advanced Technical Communication — In this course, students review writing skills and apply them to the Summer Technical Report, a major report marked both by the instructor and employers who are Institute graduates. Students also practice revision and editing skills, write several memos and give a major oral technical report. Prerequisite: TCOM 106, TCOM 206.

TCOM 308 Advanced Technical Communication — Students refine job finding skills and update their resumes and application letters. They practice specialized formats and write lengthy technical and scientific reports typical of fisheries, wildlife and parks management. Prerequisite: TCOM 209.

TCOM 402 Advanced Technical Communication — Students update their resumes and job application letters. They also write a procedure, progress report, trip report, journal and several types of advanced business letters typical of the forest industry. They practice illustrating, analytical and organizational skills and write a major report about logging equipment done in conjunction with the logging course. They receive up-to-date information about word processing.

TCOM 406 Public Information Techniques for Fish Wildlife and Recreation — In this course, students study specialized principles and techniques for communication with the public through interpretive and educational programs and the media. They write promotional data, news releases and journal articles. They practice public speaking, preparing graphic displays, interview techniques and interpretive program design. Prerequisite: TCOM 209, TCOM 308, TCOM 405.

Natural Resource Management

3rd Year Program

Forest Resource Technology

This post diploma program is designed to meet the needs of resource technologists who wish to broaden their knowledge of the major natural resources of British Columbia.

The Program

This nine-month program (two terms) examines the natural resources of British Columbia and the needs, constraints and methods to manage these resources in the best interests of the province. Included will be fish, wildlife, recreation, rangeland, hydrology (water), agriculture, mining, tourism and their interdependencies (natures).

When course credits are given, electives will be chosen in consultation with Department Head.

Prerequisite

Graduation from a BCIT diploma program or a two-year college program in an engineering or business technology. Baccalaureate degree in bio science, engineering, geography or geology will also be considered.

Faculty and Staff

W.R. Cannon, B.A., Acting Department Head
M.R. Angelo, B.S.F., M.F.
F. Cassetta, B.Sc.F., R.P.F.
C.W. Chestnut, B.A., Ph.D.
E.C. Crossin, B.S.F., R.P.F.
D. Guthrie, B.Sc., M.Sc., Ph.D.
A.G. Jakoy, B.S.F., M.F., R.P.F.
J. Simpson, B.Sc.F., M.Sc.
B. Sivak, B.S.F., M.F., Ph.D., R.P.F.

PROGRAM: Natural Resource

Level 5		Classroom hours per week ➔
FSTR 501	Fish Resource	2.0
FSTR 502	Rangeland Management	4.0
FSTR 503	Hydrology and Geomorphology	1.0
FSTR 504	Forest Land Management 3	6.0
FSTR 505	Interdependent Resources	4.0
FSTR 506	Projects Special Topics and Current Issues	6.0
FSTR 507	Wildlife Resource	2.0
FSTR 508	Recreation Resource	2.0

Level 6		Classroom hours per week ➔
FSTR 601	Natural Resource Planning	6.0
FSTR 602	Environmental Impact Assessment	6.0
FSTR 603	Environmental Law and Public Relations	3.0
FSTR 604	Natural Resource Economics	5.0
FSTR 606	Projects	5.0
FSTR 613	Independent Studies	3.0
TCOM 607	Public Information Techniques	2.0

Course Descriptions

FSTR 501 Fish Resource — The identification, habitat and life cycles of British Columbia's fish and wildlife. The principles and practice of recreational land management, and the importance of interaction with all other resources.

FSTR 502 Rangeland Management — Includes identification of common range plants, know ledge of range distribution, types of range, productivity intensity and variety of uses, assessment of productivity and stocking, range reclamation, season of use, impact on the forest resource and non-grazing use of range land. In addition range enhancement techniques, including prescribed burning, will be examined.

FSTR 503 Hydrology and Geomorphology — Hydrology-source of water, climate and topography; water flow in channels, seasonal fluctuation, concept of erosion. Geomorphology — study of physical and chemical forces acting upon the earth's surface. Development of landscapes in time.

FSTR 504 Forest Land Management 3 — The first part will include silviculture, pest management harvesting, and forest policy and management concepts and will be specifically designed for non-forestry graduates. The other half of the course will be devoted to timber supply area (TSA) management, and an advanced silviculture project designed for all students.

FSTR 505 Interdependent Resources — A conceptual overview of other non-forested resources such as agriculture, mining, water, tourism, etc.

FSTR 506 Projects, Special Topics and Current Issues — Will include discussions and use of guest lectures relating to current resource topics/issues. A project will also be selected by a student from any of these topics or one of his own choosing in the resource field.

FSTR 507 Wildlife Resource — The identification, habitat and life cycles of British Columbia's wildlife and the roles they play in the environment.

FSTR 508 Recreation Resource — The principles and practice of recreational land management. Tourism as related to outdoor recreation.

FSTR 601 Natural Resource Planning — The emphasis is on integrated resource use. Guest lecturers with expertise in resource planning may be included as part of the instructional team. The course will emphasize integrated resource planning analysis with priority setting assessments. An integrated resource project involving several weeks with considerable field input will be an integral part of this course.

FSTR 602 Environmental Impact Assessment — Assessment of environmental impact and inventory techniques.

FSTR 603 Environmental Law and Public Relations — Environmental law will include review of various provincial and federal resource Acts. Public relations will include dealing with the public, media and other resource users.

FSTR 604 Natural Resource Economics — Includes economic concepts as applied to various natural resources, and relationships to consider in cost/benefit analysis.

FSTR 606 Projects — see FSTR 506. Prerequisite: FSTR 506.

FSTR 613 Independent Studies — A block of about 90% of class time is provided for a student to choose, research and prepare a written report on a topic related to natural resources. The topic must be approved by the staff. The topic might be pursued individually or in a group.

TCOM 607 Public Information Techniques — In this course, students learn specialized techniques for communicating with the public through interpretive and educational programs and the media. They write promotional data, news releases and journal articles. They practice public speaking, preparing graphic displays, interview techniques and media programs.

Lumber and Plywood

British Columbia's leading industry is rapidly adopting advanced technology for the production of lumber and plywood. New plants use computerization with automated processes to convert raw material into end products which are in demand on local and world markets.

Job Opportunities

Young men and women with management skills are needed in B.C.'s largest industry to fill positions in supervisory, technical, marketing and sales jobs. Graduates from this technology are found in key jobs throughout B.C.'s wood products industries. Most are employed where management skills are needed as supervisors, foremen, mill managers, sales people and sales managers, traders and quality control technicians or supervisors. Graduates are also employed in many other areas where their management-oriented training is valued.

The Program

First-year students in the Lumber and Plywood Program study basic sciences and introductory courses including wood science, log utilization, and lumber tallying and grading. In the second year there is increased emphasis on manufacturing techniques, process control and economics. Second-year courses also emphasize management skills in such applications as computers, mill supervision, sales and distribution, and business communications. Classroom instruction is heavily augmented by field trips to coastal and interior operations.

Prerequisite

Algebra 12 and one Science 11, Biology, Chemistry or Physics are course requirements for this program. Applicants are sought who possess initiative, a sense of responsibility, and an interest in leadership and teamwork within industry. Industrial experience lends strength to an application.

Faculty and Staff

J.T. Neilson, B.A.Sc., P.Eng., Acting Department Head
E.G. Worthy, Dipl.T., A.S.T.T., Program Head
D.G. Mickey, Dipl.T.

TECHNOLOGY: Lumber and Plywood

PROGRAM: Lumber and Plywood

Level 1		Classroom hours per week
LUPL 101	Wood Science 1	7.0
LUPL 102	Lumber Grading 1	2.0
LUPL 103	Lumber Tallying*	2.0
LUPL 104	Log Utilization	5.0
MATH 146	Basic Technical Mathematics	5.0
MECH 101	Drafting Fundamentals	2.0
PHYS 118	Physics	5.0
TCOM 107	Technical Communication	3.0

Level 2		Classroom hours per week
CHSC 208	Engineering Materials	3.0
LUPL 108	Lumber Grading 2*	8.0
LUPL 201	Wood Science 2	4.0
MATH 246	Statistics and Quality Control	5.0
MECH 204	Drafting	2.0
PHYS 218	Physics	5.0
TCOM 207	Technical Communication	3.0

Level 3		Classroom hours per week
COMP 121	Computer Applications	3.0
ELEC 257	Electrical Equipment	4.0
LUPL 105	Lumber Manufacture	10.0
LUPL 106	Plywood Manufacture	6.0
LUPL 107	Mill Management 1	2.0
LUPL 202	Summer Technical Report	1.0
OPMT 164	Management Engineering 1	3.0
TCOM 305	Advanced Technical Communication	2.0

Level 4		Classroom hours per week
COMP 283	Linear Programming	3.0
LUPL 109	Mill Management 2	11.0
LUPL 203	Mill Audit and Quality Control	4.0
MECH 416	Mechanical Equipment	3.0
MKTG 420	Wood Products Sales and Distribution	4.0
OPMT 264	Management Engineering 2	4.0
TCOM 403	Advanced Technical Communication	2.0

* The attainment of a recognized industrial certificate with a minimum mark of 70% is required as a condition of graduation.

Course Descriptions

CHSC 208 Engineering Materials — A comparison of materials important to forest products industries including wood and wood products, concrete, metals, alloys, polymers and ceramics. Common causes of failure in service including corrosion, wear, fatigue and embrittlement. Lab sessions emphasize physical and non-destructive testing.

COMP 121 Computer Applications — Computer applications in engineering technologies; how a computer works, recognizing problems suitable for computer solution, flow-charting and communicating with computer personnel. Emphasis is on the use of computers to solve problems related to the technology. Where available, "package" programs are demonstrated and used by students. FORTRAN or BASIC programming language is taught.

COMP 283 Linear Programming — Graphical method; algebraic method; simplex method; analysis of simplex results; LKP problem formulation; use of computer to solve problems; analysis of computer solution; use of reduced costs and shadow prices; sensitivity analysis; practical applications and limitations of LP; implementation of results.

ELEC 257 Electrical Equipment — An introduction to industrial electrical equipment. Topics include AC and DC motors and their application to electro-mechanical drive systems; protecting and controlling motors; industrial electrical power systems and related equipment; sources of energy; transformation into primary and secondary voltage levels, distribution of power throughout the plant; switching; voltage control and power factor correction.

LUPL 101 Wood Science 1 — An introduction to the manufacture of forest products. Topics include elementary botany, identification of British Columbia commercial tree species, macro and micro wood technology and wood defects as they relate to lumber quality. The processing and handling of wood in preparation for lumber manufacturing — debarking, chipping, screening, conveyance and storage.

LUPL 102 Lumber Grading 1 — Given in term 1 in preparation for Lumber Grading 2, the course covers information fundamental to the grading of western softwood lumber including tree growth and wood structure, species identification, classification of products and the recognition of characteristics found naturally, and caused in manufacture.

LUPL 103 Lumber Tallying* — A full course on lumber tallying and shipping, including understanding Foot Board Measure; converting order data to specified lengths, pieces, bundles and packages; calculating wood moisture content and shrinkage; metric conversion and lumber pricing. Final examinations for certification are by the Council of Forest Industries (COFI) during which the student must achieve 70%. A COFI Certificate in Tallying is required to obtain the BCIT Diploma of Technology. Students must also obtain 50% marks during the term of the course given at BCIT.

LUPL 104 Log Utilization — Introduces the basic log-scaling procedures used in coastal mills and also includes different log-sorting methods and recovery calculations used in saw-mill and plywood industries. Considerable time is spent practicing scaling techniques on selected log booms.

LUPL 105 Lumber Manufacture — Methods and equipment used in the manufacture of lumber in the B.C. Coast and Interior are examined. Processes discussed include log preparation, initial and secondary breakdown, kiln drying and planing. Saw feeds, speeds and filing practices are also examined. Field trips augment material given in lectures.

LUPL 106 Plywood Manufacture — Methods and equipment used in the manufacture of plywood in the B.C. Coast and Interior are examined. Processes discussed include peeling, driving, lay-up and finishing. Some time is spent discussing other types of panel boards and related coatings and overlays. Field trips augment material given in lectures.

LUPL 107 Mill Management 1 — This course is designed to supplement material covered in courses on lumber and plywood manufacture. Topics include cost analysis, principles of supervision, accident prevention, fire prevention, industrial relations, maintenance organization, maintenance trades, mobile equipment, materials handling and pollution abatement. A large portion of time is spent on specific assignments in various manufacturing plants.

LUPL 108 Lumber Grading 2* — Students attend industry lumber grading classes sponsored by the Council of Forest Industries (COFI) and receive further instruction at BCIT. Final examinations for certification are given by COFI, at which time the student must achieve a 70% pass mark as a requisite to obtaining the BCIT Diploma of Technology. Students must also obtain the required 50% term marks for the in-school portion of the course.

LUPL 109 Mill Management 2 — see LUPL 107.

LUPL 201 Wood Science 2 — Topics covered include wood and chip units and conversion factors, mechanical and rheological properties, micro- and ultra-structure, wood protection and preservation. The lab section of the course is largely made up of a research project, with emphasis on reporting of methods and results. Prerequisite: LUPL 101.

LUPL 202 Summer Technical Report — Students make a detailed report on one phase of the technical operation of a forest products plant, from first-hand experience or from approved research sources.

LUPL 203 Mill Audit and Quality Control — Lectures and labs complement material given in Lumber and Plywood Manufacture courses and provide the student with the capability to set up and manage a quality control program in a sawmill and plywood plant. Besides being able to identify and correct problems related to quality, the student will be able to sample, analyze and report on size accuracy, fibre usage, product dryness and adherence to standards. Prerequisite: LUPL 105, LUPL 106.

MATH 146 Basic Technical Mathematics for Lumber and Plywood — Graphical linear programming. Exponential/logarithmic theory and transformations, common and natural logarithms and logarithmic/semilogarithmic graphs. Radian measure. Trigonometric functions of any angle, vectors and solution of triangles, graphs of trigonometric functions, identities, compound and double angle formulas, trigonometric equations and inverse functions.

MATH 246 Statistics and Quality Control for Lumber and Plywood — Organization and graphical presentation of data, frequency distributions, measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Method of least squares, regression and correlation. Analysis of variance. Control charts concepts and application, and acceptance sampling. Non-parametric statistics.

MECH 101 Drafting Fundamentals — An introductory course for persons with little or no experience in graphics. (Students are required to purchase drafting equipment and supplies on the first night of class) Students learn to produce and read simple drawings. Topics include scales, geometric constructions, basic orthographics detail interpretation, line visibility, dimensioning, auxiliary views, true shape, inclined and skew surfaces, sections, pictorials, working drawings and freehand skteches.

MECH 204 Drafting (Lumber and Plywood) — Covers topics on intersections, developments, descriptive geometry, isometrics and piping, drawings and mechanical equipment detail, and layout projects associated with lumber production.

MECH 416 Mechanical Equipment (Lumber) — A study of mechanical equipment relating to the transmission, application and control of power, with particular reference to the wood processing industry. Topics include line shafting, flexible couplings, V-belt and roller chain drives, gearing, variable speed drives; hydraulic and pneumatic systems, centrifugal pump applications and lubrication and bearings.

MKTG 420 Wood Products Sales and Distribution — Examines the major domestic and export markets for lumber and plywood, including ongoing changes in all types of distribution and transportation systems used by the forest products industry. The sales process, from telephone solicitation to complete documentation of FOB and CIF orders, is covered in detail.

OPMT 164 Management Engineering 1 — Lumber and Plywood — An organized approach to problem-solving, with emphasis on the forest products industry. Method study techniques such as problem selection, process charting, multiple activity charting, activity sampling, motion economy and critical examination and development of alternatives are covered. The course also includes an introduction to work measurement. The importance of establishing good human relations with employees is stressed throughout.

OPMT 264 Management Engineering 2 — Lumber and Plywood — The techniques required to solve plant layout and materials handling problems are covered and the student applies these techniques to a comprehensive in-house project. As a term project, the student selects for study a job in an industrial plant in

the forest products industry. The student applies the techniques learned in OPMT 164 and the first part of this course to the solution of a plant project and submits a written report on the findings, including conclusions and recommendations.

PHYS 118 Physics for Lumber and Plywood — An introductory course covering statics, dynamics, momentum, force, friction, energy, power, angular momentum, simple machines, properties of solids, fluids, fluid mechanics, thermal properties of matter, thermal energy, basic electricity and magnetism, optics and atomic and nuclear phenomena.

PHYS 218 Physics for Lumber and Plywood — see PHYS 118.

TCOM 107 Technical Communication for Lumber and Plywood — Prepares students for writing technical material relevant to the lumber and plywood industry. Students study and practice the principles of clear, concise and precise writing and apply those principles to instructions, field trip reports, process descriptions, memos and descriptions of hardware. In addition, students practice oral communication skills.

TCOM 207 Technical Communication for Lumber and Plywood — Further prepares students for writing for the lumber and plywood industry. Students write letters, job application letters, resumes, proposals, progress reports and a technical report done jointly with an engineering course. Students also learn interview techniques. Prerequisite: TCOM 107.

TCOM 305 Advanced Technical Communication for Lumber and Plywood — Students review and practice technical reporting. They write several memos and a Summer Technical Report which is marked jointly by the instructor and people employed in the lumber and plywood industry. They practice illustrating, revising and editing skills, and present an oral technical report. Prerequisite: TCOM 107, TCOM 207.

TCOM 403 Advanced Technical Communication for Lumber and Plywood — Students write technically advanced material typical of the forest products industry. They update their resumes and job application letters and write technical definitions and descriptions, procedures, instructions, trip reports and technical letters. They write one long report based on observations in a mill, in conjunction with an engineering course. Prerequisite: TCOM 107, TCOM 207, TCOM 305.

Mining

Technologists have an important role to play in the exploration, development, and extraction of mineral resources. Up-to-date technology such as computer applications are vital to B.C. and Canadian mining due to narrow profit margins. Coal, industrial mineral and precious metal sectors have expanded to major roles. The technology is many-faceted, and the opportunities are similarly wide-ranging.

Job Opportunites

Graduates enter a wide field of mining and related occupations, from exploration to production, from field to office: geology, geophysics, geochemistry, surveying, sampling, assaying, mine planning, production supervision, services (eg. water control, road construction), rock mechanics, diamond drilling, blasting, equipment sales and computer applications. After an initial training period, one can expect varied, creative, and often independent work with considerable responsibility. Quick advancement to supervisory positions is possible to graduates with initiative, ability and leadership.

Mining communities tend to have well-supported entertainment, sport, and outdoor recreation facilities. These and other benefits often permit the young family to start budgets on a more positive note.

The Program

Courses reflect the wide range of applications and include the following: geology and mining topics in all terms, mineral processing and assaying, several civil engineering courses, surveying, physics, math and communications courses particularly adapted to mining problems. Projects and assignments emphasize industry applications and a hands-on approach and are increasingly computer-oriented. Field schools and guest lecturers are important aspects of the curriculum.

BCIT Mining students enjoy an unusually high level of student financial assistance.

There are good transfer arrangements with several universities and approximately 25% of our students ultimately continue to engineering degrees.

The program is accredited by the Applied Technologists and Technicians of British Columbia.

Prerequisite

Algebra 12, Physics 11 and Chemistry 11 are course requirements for this program.

Faculty and Staff

J.T. Neilson, B.A.S., P.Eng., Acting Department Head
D.J. Hardie, H.N.C.
G.S. Headley, B.A.Sc., M.Eng.

TECHNOLOGY: Mining

PROGRAM: Mining

Level 1		Classroom hours per week
CHEM 101	Applied Chemical Principles 1	6.0
MATH 150	Basic Technical Mathematics for Mining	5.0
MECH 101	Drafting Fundamentals	2.0
MINE 101	Geology 1	3.0
MINE 102	Mining	2.0
PHYS 101	Physics	6.0
SURV 140	Surveying	3.0
SURV 142	Hand Held Computer Techniques	1.0
TCOM 110	Technical Communication for Mining	3.0

Level 2		Classroom hours per week
CHEM 201	Applied Chemical Principles 2	6.0
MATH 250	Calculus 1 and 2 for Mining	5.0
MECH 201	Drafting	2.0
MINE 201	Geology 1	4.0
MINE 202	Mining	2.0
PHYS 201	Physics for Mining	3.0
PHYS 204	Introductory Geophysics	3.0
SURV 240	Surveying	3.0
TCOM 211	Technical Communication for Mining	3.0

Level 3		Classroom hours per week
CHSC 305	Assaying	4.0
CHSC 314	Mineral Processing	3.5
CIVL 339	Statics and Strength of Materials	3.0
MATH 350	FORTRAN and Network Scheduling for Mining	5.0
MINE 301	Structural Geology	3.5
MINE 302	Mining	4.0
PHYS 304	Mining Geophysics	1.5
SURV 340	Surveying	3.0
TCOM 306	Advanced Technical Communication for Mining	2.0

Level 4		Classroom hours per week
CHSC 405	Assaying	4.0
CHSC 414	Mineral Processing	3.5
CIVL 440	Statics and Strength of Materials	3.0
CIVL 441	Hydraulics	3.0
MATH 450	Statistics for Mining	5.0
MINE 401	Geology — Mineral Deposits	3.5
MINE 402	Mining	4.0
SURV 440	Surveying	3.0
TCOM 404	Advanced Technical Communication for Mining	2.0

Course Descriptions

CHEM 101 Applied Chemical Principles 1 — Provides the necessary background for chemical calculations and analysis. Included are stoichiometry, atomic structure, bonding, solution preparation and acid-base and oxidation-reduction reactions and titrations. Simple chemical equilibrium leads to a good working knowledge of pH, buffer solutions, solubility product, selective precipitation and industrial processes involving equilibria. Lab work consists of simple qualitative and quantitative analysis and good lab technique is taught.

CHEM 201 Applied Chemical Principles 2 — A continuation of CHEM 101 giving detailed coverage of gravimetric and volumetric analysis and qualitative analysis of cations and anions. Electrochemistry includes cells, electroplating and corrosion. Simple physical chemistry provides theory of solids, liquids and gases leading to fractional distillation and colligative properties. The Periodic Table is used to correlate many properties of elements and compounds. Names and properties of some organic compounds are covered and lab work covers qualitative and quantitative analysis and physio-chemical separations.

CHSC 305 Assaying — Analytical chemistry applied to the ore minerals, with special attention to fire assaying for gold and silver. Gravimetric, volumetric and instrumental methods are developed for the more common metals.

CHSC 314 Mineral Processing — Deals specifically with mineral processing as appplied to the B.C. mining industry. Covers the essential operations of applied mineral processing ie: grinding, screening, gravity separation, cyclone classification, flotation, sedimentation, thickening, filtration. Emphasis on numerical solution of operating and design type problems. Course includes laboratory work.

CHSC 405 Assaying — A continuation of CHSC 305.

CHSC 414 Mineral Processing — A continuation of CHSC 314. Prerequisite: CHSC 314.

CIVL 339 Statics and Strength of Materials — The definitions, representations and uses of forces and moments are presented, leading to the equations of equilibrium. Following topics include: free bodies, trusses, stresses and shear and bending moment diagrams.

CIVL 440 Statics and Strength of Materials — Simple stresses; stress, strain elasticity; compound bars and columns; temperature stress; elastic limit; limit of proportionality; yield; ultimate; factor of safety; load factor; ductility; resilience; fatigue; shock. Properties of sections; bending moments; shear forces; theory of flexure; deflection of beams; eccentric loading; lateral loading; compound stress and strain; Poisson's ratio; principal stress and strains; Mohr's circle; testing techniques; machines; extensometers; strain gauges; photo elasticity. Special sessions on rock mechanics. Prerequisite: CIVL 339.

CIVL 441 Hydraulics — Properties of fluids, hydrostatics, pressure and centre of pressures; fluid flow, continuity equation, velocity head, Venturi meters. Pipe friction and flow. Flow conditions. Open channel flow in flumes and streams. Flow measurement. Lab demonstrations. Pumps. Prerequisite: CIVL 339.

MATH 150 Basic Technical Mathematics for Mining — Graphical linear programming. Exponential/logarithmic theory and transformations, common and natural logarithms and logarithmic/semilogarithmic graphs. Radian measure. Trigonometric functions of any angle, vectors and solution of triangles, graphs of trigonometric functions, identities, compound and double angle formulas, trigonometric equations and inverse functions.

MATH 250 Calculus 1 and 2 for Mining — Limits, the derivative, differentiation rules for algebraic, trigonometric, inverse trigonometric, logarithmic and exponential functions; curve sketching, implicit differentiation, higher order derivatives, applied maxima/minima, related rates and differentials. Antidifferentiation, the indefinite integral and the definite integral including area, volume, centroid and other applications. Tables of integrals, integration by parts, partial fractions and substitution techniques.

MATH 350 FORTRAN and Network Scheduling for Mining — FORTRAN arithmetic and variables, input/output and formatting, branching, arrays, functions and subroutines. Critical path networking principles, events, activities and slack. Network replanning and adjustment, and crashing a project. Scheduling under limited resources and resource leveling.

MATH 450 Statistics for Mining — Linear programming using the simplex method. Organization and graphical presentation of data, frequency distributions and measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Method of least squares, regression and correlation. Geostatistical estimation.

MECH 101 Drafting Fundamentals — An introductory course for persons with little or no experience in graphics. (Students are required to purchase drafting equipment and supplies on the first night of class) Students learn to produce and read simple drawings. Topics include scales, geometric constructions, basic orthographics detail interpretation, line visibility, dimensioning, auxiliary views, true shape, inclined and skew surfaces, sections, pictorials, working drawings and freehand skteches.

MECH 201 Drafting (Mining) — Involves techniques in ink, contours, intersection and developments, dip, strike and outcrop, sections, profiles, descriptive geometry and other graphical mining problems.

MECH 301 Machine Design 1 — The theory in prerequisite courses is covered plus combined stresses with emphasis on solution by Mohr's circle; theories of failure; stress concentration; fatigue phenomena; welded connections; bolted and rivited connections; spur; helical and worm gear drives; speed reducers; belt and roller chain drives; flexible couplings; shafts; antifriction and journal bearing; brakes and clutches; power screws; helical and leaf springs; an introduction to mechanical vibrations with emphasis on the critical speeds of rotating assemblies. Continued in MECH 401.

MINE 101 Geology 1 — Definition, basic concepts, earth's crust, geologic time; atomic structure of minerals, crystal forms and symmetry systems; properties of common minerals, sedimentary rock types, clastic and chemical sedimentaries; igneous rock types, classification; deformation of earth's crust, folds, faults; metamorphic rocks; weathering, erosion and glaciation; economic geology, mineral fuels, non-metallics, ore deposits and their controls; geological history, pre-Cambrian, Paleozoic, Mesozoic, Tertiary, Pleistocene; geologic maps.

MINE 102 Mining — The objective: an introduction to the general sphere of mining and, more particularly, mining exploration. 10 hrs. on identifying the factors important to mine profitability; 20 hrs. giving a unified picture of modern prospecting techniques: geochemistry in some detail, geology, geophysics, geostatistics, sampling and diamond drilling. Maps, photos, reports and references; economics, planning and management.

MINE 201 Geology — Definition, basic concepts, earth's crust, geologic time; atomic structure of minerals, crystal forms and symmetry systems; properties of common minerals, sedimentary rock types, clastic and chemical sedimentaries; igneous rock types, classification; deformation of earth's crust, folds, faults; metaphorphic rocks; weathering, erosion and glaciation; economic geology, mineral fuels, non-metallics, ore deposits and their controls; geological history, pre-Cambrian, Paleozoic, Mesozoic, Tertiary, Pleistocene; geologic maps. A continuation of MINE 101.

MINE 202 Mining — A full description of mining methods; brief subjective descriptions of rock mechanics, fragmentation and mine services which receive detailed treatment elsewhere. Unit operations of drilling, blasting, loading and hauling are discussed in the context of organization, equipment, labor and supplies. Prerequisite: MINE 102.

MINE 301 Structural Geology — Brief review of mechanical principles of rock deformation and of the primary structures of sedimentary, igneous and metamorphic rocks. The origin, nature and classifaction of joints, folds and faults, with emphasis on their relation to mineral resources. Lab work includes examinations of specimens, methods of recording structural data, mapping and solution of structural problems, with emphasis on economic aspects. Prerequisite: MINE 203.

MINE 302 Mining — Two objectives: rock mechanics and mine services. Rock mass classification and field observations, data storage and retrieval (stereonet), stress field description and modes of failure, ground water effects, ground control methods (pit slope stability design, pillars, subsidence and underground support systems) and ground movement monitoring. Electrical power, compressed air, water control ventilation, underground development, materials handling systems not otherwise covered, reclamation and pollution control, safety, management. Guest lecturers used extensively. Prerequisite: MINE 204.

MINE 401 Geology — Mineral Deposits — The terminology, classification, manner of occurrence, distribution and economics of mineral resources, with emphasis on typical Canadian occurrences. Ways of recognizing, discovering and developing mineral deposits. Lab work illustrates and develops techniques in megascopic study and identification of hand specimens; valuation of mineral deposits, computer data storage and retrieval. Field trips are correlated with all classroom work in geology. Prerequisite: MINE 203.

MINE 402 Mining — Two objectives: mine planning and fragmentation. Economics: cost estimating both capital and operating, accounting and records, taxation, marketing (smelter and coal contracts and specifications), balance sheets, financial statements, cash flows and present values, equipment selection. Sampling, cutoffs, waste/ore ratios, geostatistics and mine modelling, largely computerized. Fragmentation subjects include drilling systems, explosive properties and products, safety, field application design. Field labs include high speed photography of students' full scale tests. Prerequisite: MINE 206.

PHYS 101 Physics for Mining, Natural Gas and Petroleum — A general level course covering mechanics, dynamics and the properties of solids and fluids. The associated laboratory covers the principles of measurement and the experimental method of acquiring knowledge.

PHYS 201 Physics for Mining, Natural Gas and Petroleum — A general level course covering thermal properties of matter, waves, electricity, magnetism, electromagnetism and atomic and nuclear physics.

PHYS 204 Introductory Geophysics — Utilizing concepts covered in PHYS 201, the course is an introduction to the uses of geophysics in the search for ore deposits. The course consists of lectures, case study exercises and some field exercises covering the gravity, magnetic, resistivity, self-potential and seismic method of analyzing the physical properties of the earth.

PHYS 304 Mining Geophysics — Consists of field work and some lectures on geophysical methods of mineral exploration. Emphasis is on the operation of geophysical instruments, the method of conducting geophysical surveys and the presentation and interpretation of data.

SURV 140 Surveying — Substance of course on ground points, sighting devices; measurement of distances and angles with a variety of instruments, tapes, etc., under a variety of conditions; compass; accuracy and precision; planetable; errors and mistakes; direction; stadia, profiling; topography; line production offsets; interlining and intersection; random lines and physical feature ties; computations — traverses, coordinate systems; triangulation; areas and volumes; special engineering survey problems and curves.

SURV 142 Hand Held Computer Techniques — An introductory course in the use of the microcomputer to solve various mathematical and surveying problems. Emphasis will be on the application of the small computer system to the solution of mining related problems. Topics include computer programming in BASIC and in small computer systems communications.

SURV 240 Surveying — see SURV 140.

SURV 340 Surveying — Application of survey methods to underground and surface mines. Underground surveying in shaft sinking, development control (level and inclined) and production areas. Elementary astronomy, establishing azimuth by solar and pole star observations. Mine quantities in development areas, pickup of tunnels, cross sectioning, stopes (including tonnage calculations). Construction of mine plans and sections. Field projects include tunnel surveys and open-pit triangulation, tri-lateration and bench pickup. Mining Acts applied to surveying.

SURV 440 Surveying — This is a continuation of SURV 340. The content is the same.

TCOM 110 Technical Communication for Mining — Students receive practice in entry-level writing skills for the mining industry. They write letters of inquiry, request, complaint and adjustment, and short technical memos. They also give an oral technical report.

TCOM 211 Technical Communication for Mining — The major portion of the course provides instruction and practice in writing many different kinds of short, informal, industry-related reports. Students learn how to write resumes and job application letters. They also participate in job interviews, meetings and oral technical briefings. Prerequisite: TCOM 110.

TCOM 306 Advanced Technical Communication for Mining — This course builds on the practice and principles presented in first year. It introduces students to more difficult kinds of letters, memos and short reports. It includes instruction and practice in handling criticism and grievance procedures, participating in meetings, retrieving technical mining-related data, and briefing small groups. As far as possible, assignments are integrated with students' other courses. Prerequisite: TCOM 110, TCOM 211.

TCOM 404 Advanced Technical Communication for Mining — Students complete and update the job search component begun in first year. They then work on more specialized technical reports — site descriptions, geological reports and analytical reports on specific mining methods and equipment. They give a final technical briefing on their mining methods report. As far as possible, assignments are integrated with students' other courses. Prerequisite: TCOM 110, TCOM 211, TCOM 306.

Natural Gas and Petroleum

Because of its size and diversity, the petroleum industry is unique, both in its extremely wide range of occupational opportunities, and in the many challenges it offers employees for learning and growing.

Job Opportunities

The petroleum industry can be considered under four general areas: Exploration and Production, Transmission and Distribution, Manufacturing (refining), and Marketing. There are a variety of positions to be filled by Natural Gas and Petroleum Technology graduates in each of these areas. Past graduates are successfully employed in all these areas, both in Canada and throughout the world. Positions available include:

Exploration and Production: geologic studies, reservoir studies, well testing and servicing.

Transmission and Distribution: operation and maintenance of pipelines, utility studies and corrosion control.

Manufacturing: process operations, laboratory and product quality control, effluent control.

Marketing: product application for all of the petroleum products produced for commercial and industrial equipment.

The Program

The curriculum is designed to cover all major aspects of the petroleum industry, thereby enabling the graduate to successfully enter any area of the industry. The first year covers petroleum geology, reservoir studies and the production and field handling of oil and gas. Emphasis is also given to the basic sciences — chemistry, physics and mathematics — necessary for the scientific and engineering principles involved in studies throughout the course.

The second year covers pipeline transmission, oil refining and products utilization and gas distribution. Alternate fuels are also examined. Computer applications in all areas of studies will be emphasised. Classroom and laboratory instruction will be supplemented by field trips to local installations.

This program is accredited by the Applied Science Technologists and Technicians of B.C.

Prerequisite

Algebra 12, Physics 11 or Chemistry 11 are course requirements for this program. Students should have a keen interest in the operation of large-scale equipment, be prepared to work outdoors and, with training, must be capable of assuming responsibility for the satisfactory and safe operation of highly complex plant equipment.

Faculty and Staff

J.T. Neilson, B.A.Sc., P.Eng., Acting Department Head
D.A. Campbell, B.A., (Hons.), M.Ed.
R.G. Kinney, Dipl.T., A.S.T.T.B.C.

TECHNOLOGY: Natural Gas and Petroleum

Level 1		Classroom hours per week
CHEM 101	Applied Chemical Principles 1	6.0
CHSC 106	Engineering Materials	3.5
MATH 147	Basic Technical Mathematics	5.0
NGAS 102	Petroleum Geology	4.0
NGAS 103	Properties of Reservoir Fluids	3.0
PHYS 101	Physics	6.0
TCOM 108	Technical Communication	3.0

Level 2		Classroom hours per week
CHEM 201	Applied Chemical Principles 2	6.0
COMP 122	Computer Applications	2.0
MATH 247	Calculus 1 and 2	5.0
NGAS 201	Field Production of Gas and Oil	3.0
NGAS 202	Field Handling of Gas and Oil and Gas Processing	2.0
PHYS 201	Physics	3.0
PHYS 204	Introductory Geophysics	3.0
SURV 128	Introduction to Surveying	3.0
TCOM 208	Technical Communication	3.0

Level 3		Classroom hours per week
CHEM 310	Physical Chemistry	5.0
CHSC 341	Unit Operations	6.0
CHSC 351	Pollution Control	3.0
MATH 347	Differential Equations	5.0
NGAS 306	Oil Refining	4.0
NGAS 307	Oil and Gas Pipeline Transmission	6.0
NGAS 308	Fuels	2.0

Level 4		Classroom hours per week
CHEM 415	Petroleum Chemistry	5.0
CHSC 441	Unit Operations	6.0
MATH 447	Statistics and Numerical Methods	5.0
NGAS 401	Gas Distribution and Utilization	4.0
NGAS 402	Petroleum Products: Testing and Utilization	5.0
NGAS 403	Process Dynamics	3.0
NGAS 404	Computer Simulation and Control	2.0

Course Descriptions

CHEM 101 Applied Chemical Principles 1 — Provides the necessary background for chemical calculations and analysis. Included are stoichiometry, atomic structure, bonding, solution preparation and acid-base and oxidation-reduction reactions and titrations. Simple chemical equilibrium leads to a good working knowledge of pH, buffer solutions, solubility product, selective precipitation and industrial processes involving equilibria. Lab work consists of simple qualitative and quantitative analysis and good lab technique is taught.

CHEM 201 Applied Chemical Principles 2 — A continuation of CHEM 101 giving detailed coverage of gravimetric and volumetric analysis and qualitative analysis of cations and anions. Electrochemistry includes cells, electroplating and corrosion. Simple physical chemistry provides theory of solids, liquids and gases leading to fractional distillation and colligative properties. The Periodic Table is used to correlate many properties of elements and compounds. Names and properties of some organic compounds are covered and lab work covers qualitative and quantitative analysis and physio-chemical separations.

CHEM 310 Physical Chemistry — Presents the kinetic theory of gases, the first and second laws of thermodynamics, phase equilibria, chemical kinetics and catalysis. Lab work consolidates lecture material and gives experience in practical physio-chemical measurements.

CHEM 415 Petroleum Chemistry — Presents a survey of the properties and common reactions of the classes of organic compounds which are found in petroleum or are of importance in the petrochemical industry. The chemistry of refining processes, instrumental lab analysis and synthesis of some petrochemicals are presented.

CHSC 106 Engineering Materials — A comparison of materials — concrete, metals, alloys, polymers and ceramics. Common causes of failure in service including corrosion, wear, fatigue and embrittlement. Lab sessions emphasize physical testing and non-destructive testing.

CHSC 341 Unit Operations — First and second law of thermodynamics; enthalpy, entropy, phase rule, thermodynamic diagrams and tables; properties of steam; fluid flow and measurement in pipes and channels, piping, pipe fittings and valves; flow of heat, conduction, convection, radiation, film and overall transfer co-efficients, heat exchangers; principles and application of equipment for evaporation, distillation, absorption, extraction; humidification and dehumidification; drying; solid-liquid and liquid-liquid extraction.

CHSC 351 Pollution Control — Fundamentals of waste treatment and management systems. Basic sampling and testing techniques.

CHSC 441 Unit Operations — see CHSC 341.

COMP 122 Computer Applications — Introduction to the components of a computer. Introduction to "BASIC" on a microcomputer. Relationship of data to input/output. Introduction to "FORTRAN" and "WATFIV" on the IBM mainframe computer. The problems solved via programming are in the natural gas & petroleum field.

MATH 147 Basic Technical Mathematics for Gas and Petroleum — Graphical linear programming. Exponential/logarithmic theory and transformations, common and natural logarithms and logarithmic/semilogarithmic graphs. Radian measure. Trigonometric functions of any angle, vectors and solution of triangles, graphs of trigonometric functions, identities, compound and double angle formulas, trigonometric equations and inverse functions.

MATH 247 Calculus 1 and 2 for Natural Gas and Petroleum — Limits, the derivative, differentiation rules for algebraic, trigonometric, inverse trigonometric, logarithmic and exponential functions; curve sketching, implicit differentiation, higher order derivatives, applied maxima/minima, related rates and differentials. Antidifferentiation, the indefinite integral, and the definite integral including area, volume, centroid and other applications. Tables of integrals, integration by parts, partial fractions and substitution techniques.

MATH 347 Differential Equations for Natural Gas and Petroleum — Methods of integration including integration by parts, trigonometric substitution and partial fractions. Partial differentiation with applications. Elementary differential equations and separation of variables. First order (integrating factor and numerical solution) and second order differential equations with applications.

MATH 447 Statistics and Numerical Methods for Natural Gas and Petroleum — Organization and graphical presentation of data, frequency distributions and measures of central tendency, variation and other measures. Probability theory and laws. Random variables, discrete and continuous theoretical distributions. Sampling, estimation and hypothesis testing with both large and small samples. Method of least squares, regression and correlation. Linear programming using the simplex method and the transportation problem. Solution of algebraic and transcendental equations by iterative methods.

NGAS 102 Petroleum Geology — Covers topics in petroleum geology and rotary drilling. Petroleum geology topics include: historical geology, composition of the earth's crust, origin of petroleum, petroleum migration, geology of reservoirs, structural and stratigraphic traps, sedimentary formations, carbonate formations, basic reservoir production calculations, construction of isochore and isopach subsurface maps. Rotary drilling topics include: drilling rigs, the drill string, drilling, drilling fluids, well control, down-hole equipment, an introduction to well testing and servicing.

NGAS 103 Properties of Reservoir Fluids — Introduces the student to the chemical composition and physical properties of natural gas and crude oil, and the phase behavior these fluids exhibit during production from a reservoir. Some elementary applications of reservoir flow characteristics are considered.

NGAS 201 Field Production of Gas and Oil — Covers basic down-hole hydraulics and an introduction to reservoir analysis and production. Topics include drilling fluids, hydraulics, core analysis, reservoir fluid flow, PVT analysis, reserves determination, production techniques and enhanced recovery techniques. A project related to reserves determination will be assigned during the term. Prerequisite: NGAS 102.

NGAS 202 Field Handling of Oil and Gas Processing — Covers the handling of crude oil and natural gas from the well head to the transmission pipeline. Field handling to include: fluid stabilization, gas separation, hydrate control, emulsion treating, well effluent recombination calculations. Gas processing covers: sweetening, sulfur recovery, dehydration, natural gas liquids recovery. A technical report with oral presentation is required.

NGAS 306 Oil Refining — Petroleum refining is a very complex operation due mainly to the multitude of products that are made. This course covers the refining processes involved in the production of these products. Processes considered include: atmospheric and vacuum distillation; thermal, catalytic and hydro cracking; catalytic reforming; alkylation; polymerization; hydrotreating; chemical treating; lubricating oil refining; process and effluent water treating; air quality control. A term paper with oral presentation is required.

NGAS 307 Oil and Gas Pipeline Transmission — An introduction to natural gas transmission. Topics covered include: natural gas quality, large volume natural gas measurement, pipeline flow and design calculations, pipeline construction, design and operating codes, corrosion control, pipeline control and compressor stations.

NGAS 308 Fuels — Examines alternate uses of conventional fossil fuels. Utilization, availability and production techniques of gaseous, liquid and solid fuels are discussed. Alternate fuel sources and alternate fuel applications are then examined. Topics include: natural gas, manufactured (coal) gas, LNG, LPG, gasolines, diesel fuel, fuel oils and types of coal. Alternate fuel topics include: simulated fuels, supplemental fuels and synthetic fuels. The use of compressed natural gas, propane and or gasoline/alcohol as a motor fuel will also be examined.

NGAS 401 Gas Distribution and Utilization — An introduction to the distribution and utilization of natural gas. Topics covered include: gas measurement, pressure regulation, design and construction of distribution systems, corrosion control, leak surveys, maintenance, gas contract control, peak shaving, burner design, customer relations, system design and operational codes.

NGAS 402 Petroleum Products: Testing and Utilization — Many different products are produced in an oil refinery. Each product has its own individual requirements depending on the use to which it is to be put. The lecture part of the course examines the desired properties and specifications of these products and the equipment in which the products are used. Laboratory periods cover the testing of various products obtained from a typical crude oil. Supplementing these studies are field trips to local refineries. A major term paper is required. Prerequisite: NGAS 306.

NGAS 403 Process Dynamics — Introduces a practical and effective computer based approach for studying and evaluating 'real time' process control situations. The student is required to produce interim progress reports during the course and a final, formal technical report at the end of the course. Topics include: system dynamics, response time, control strategies, system optimization, system modelling, flow charting, transducer and control valve evaluation.

NGAS 404 Computer Simulation and Control — A course in basic computer simulation and control techniques. Emphasis will be on practical input-output applications utilizing an inexpensive 8 BIT microprocessor. Topics include: concept of computer control, input-output software and hardware, interfacing, analog-digital conversions and practical applications.

PHYS 101 Physics for Mining, Natural Gas and Petroleum — A general level course covering mechanics, dynamics and the properties of solids and fluids. The associated laboratory covers the principles of measurement and the experimental method of acquiring knowledge.

PHYS 201 Physics for Mining, Natural Gas and Petroleum — A general level course covering thermal properties of matter, waves, electricity, magnetism, electromagnetism and atomic and nuclear physics.

PHYS 204 Introductory Geophysics — Utilizing concepts covered in PHYS 201, the course is an introduction to the uses of geophysics in the search for ore deposits. The course consists of lectures, case study exercises and some field exercises covering the gravity, magnetic, resistivity, self-potential and seismic method of analyzing the physical properties of the earth.

SURV 128 Introduction to Surveying Natural Gas and Petroleum — The theory of engineering survey. Practical application of linear measurements. Introduction to and theory of the theodolite. Bearings and traverse computations. Introduction to and theory of levelling. Computation of areas and volume.

TCOM 108 Technical Communication for Natural Gas and Petroleum — In this course, students learn the fundamentals of clear technical writing and the principles of style and organization. They write documents relevant to the natural gas and petroleum industry, including technical descriptions and letters and memos of request, adjustment and collection.

TCOM 208 Technical Communication for Natural Gas and Petroleum — Students learn the fundamentals of job seeking, meetings and reporting. They write resumes, job application letters, technical briefs and proposals, and evaluation, recommendation, trip progress and occurrence reports. They practice chairing meetings and presenting oral reports.

Chemical Sciences

Chemical principles and processes form the base of modern industrial society. Whether in the research laboratory or industrial chemical plant, the chemical analyst and chemical process technologist are in great demand. Their skills find challenges on many fronts, including solving environmental pollution problems. Because chemical principles are so universally used, graduates of the Chemical Sciences program find employment in almost every major industrial and research activity in B.C.

Job Opportunities

Graduates are employed as chemists and analysts in research facilities and commercial and industrial labs; engineering assistants in consulting firms; production supervisor trainees in production plants; analysts in environmental and chemical laboratories; assayers or mineral processing technicians in extractive metallurgy plants; process technologists in pulp mills and as corrosion specialists and non-destructive testing specialists.

The Program

The Chemical Sciences Program offers the student grounding in general science and technology courses in the first year of studies, with the opportunity for further specialization in second year.

The first year curriculum emphasizes applied chemistry, general laboratory procedures and testing, and introduces the student to a wide range of industrial chemical processes.

In the second year, Analytical Chemistry, Unit Operations and Unit projects are compulsory throughout, while most other courses are chosen on an elective basis, depending on which technology the student wishes to specialize in. The following programs are offered: *Industrial Chemistry, Laboratory Chemistry, Environmental Science and Pollution Control, Pulp and Paper, Extractive Metallurgy, Physical Metallurgy.*

Prerequisite

Chemistry 11 and Algebra 12 are course requirements for this program.

Faculty and Staff

J.T. Neilson, P.Eng., Acting Department Head
S. Berghold
J. Berry, B.Sc., Ph.D., Program Head
W.J. Bogyo, B.C.L.Ass., Senior Instructor
J.T. Denely, B.Sc., P.Eng., (Alta.)
R. Drouin, Dipl.T.
W.R. Irvine, B.A., M.Sc., P.Eng., Senior Instructor
D.J. McLeod, A.R.M.T.C., A.I.M.
T. Malakoff, Dipl.T.
G.A. Smook, B.S., P.Eng.
T. Voksepp, B.A.Sc., P.Eng.

PROGRAM: Chemical Sciences

Level 1		Classroom hours per week
CHEM 101	Applied Chemical Principles 1	6.0
CHSC 103	Engineering Materials	3.5
CHSC 119	Environmental Science	4.5
MATH 141	Basic Technical Mathematics	5.0
MECH 103	Drafting Fundamentals	4.0
PHYS 114	Physics	5.0
TCOM 102	Technical Communication	3.0

Level 2		Classroom hours per week
CHEM 201	Applied Chemical Principles 2	6.0
CHEM 204	Chemical Laboratory Techniques	3.0
CHSC 202	Laboratory Workshop	1.5
CHSC 203	Engineering Materials	3.5
CHSC 246	Industrial Chemical Processes	3.5
MATH 241	Statistics 1 and Calculus 1	5.0
PHYS 214	Physics	5.0
TCOM 202	Technical Communication	3.0

Level 3 Common		Classroom hours per week
CHEM 310	Physical Chemistry	5.0
CHEM 314	Analytical Chemistry 1	6.0
CHSC 320	Unit Project	2.0
CHSC 341	Unit Operations	6.0
MATH 341	Numerical Methods with BASIC	5.0

Electives		Classroom hours per week
CHEM 309	Organic Chemistry	6.0
CHSC 304	Physical Metallurgy	6.0
CHSC 307	Extractive Metallurgy	6.0
CHSC 311	Pollution Science and Organic Chemistry	6.0
CHSC 346	Pulp and Paper	6.0

Level 4 Common		Classroom hours per week
CHEM 414	Analytical Chemistry 2	6.0
CHSC 420	Unit Project	3.0
CHSC 441	Unit Operations	6.0

Elective 1		Classroom hours per week
CHEM 409	Organic Chemistry for Chemical Science 2	6.0
CHSC 404	Physical Metallurgy	6.0
CHSC 407	Extractive Metallurgy	6.0
CHSC 411	Pollution Science and Microbiology	6.0
CHSC 446	Pulp and Paper	6.0

Elective 2		Classroom hours per week
CHSC 408	Ore Analysis	3.0
CHSC 412	Waste Management	3.0

Elective 3		Classroom hours per week
CHSC 413	Environmental Analytical Methods	3.0
NGAS 403	Process Dynamics	3.0

Elective 4		Classroom hours per week
CHEM 416	Analytical Instrumentation 1	2.0
ELEC 468	Process Measurements	2.0

Elective 5		Classroom hours per week
CHSC 438	Coal Chemistry	2.0
CHSC 448	Industrial Chemistry	2.0
MATH 441	Calculus 2 and Differential Equations	2.0

Course Descriptions

CHEM 101 Applied Chemical Principles 1 — Provides the necessary background for chemical calculations and analysis. Included are stoichiometry, atomic structure, bonding, solution preparation and acid-base and oxidation-reduction reactions and titrations. Simple chemical equilibrium leads to a good working knowledge of pH, buffer solutions, solubility product, selective precipitation and industrial processes involving equilibria. Lab work consists of simple qualitative and quantitative analysis and good lab technique is taught.

CHEM 201 Applied Chemical Principles 2 — A continuation of CHEM 101 giving detailed coverage of gravimetric and volumetric analysis and qualitative analysis of cations and anions. Electrochemistry includes cells, electroplating and corrosion. Simple physical chemistry provides theory of solids, liquids and gases leading to fractional distillation and colligative properties. The

Periodic Table is used to correlate many properties of elements and compounds. Names and properties of some organic compounds are covered and lab work covers qualitative and quantitative analysis and physio-chemical separations.

CHEM 204 Chemical Laboratory Techniques — This course teaches basic techniques in sampling, weighing, moisture determination, ashing, extractions, filtration gravimetric methods and volumetric methods. Instrumental analysis and separation methods will be described, demonstrated and, whenever possible, practised.

CHEM 309 Organic Chemistry — Organic compounds are classified according to functional groups. Naming using IUPAC, common names and trade names of many industrial chemicals. Factors affecting boiling point and solubility, theory of extraction. Preparation and reactions of alkanes, alkenes, aromatics, alcohol. Petroleum refining, addition polymerisation, synthetic rubber. Theory of infrared spectroscopy, interpretation of spectra.

CHEM 310 Physical Chemistry — Presents the kinetic theory of gases, the first and second laws of thermodynamics, phase equilibria, chemical kinetics and catalysis. Lab work consolidates lecture material and gives experience in practical physio-chemical measurements.

CHEM 314 Analytical Chemistry 1 — The course covers the theory and practice of conventional methods of inorganic analysis and includes methods of sample decomposition, sampling, treatment of analytical data, precipitation and complex formation titration, solvent extraction and ion exchange methods, and fire assaying. Laboratory exercises include the ore analysis for iron, chromium, tin, copper, arsenic, zinc, sulphur and silica, as well as fire assaying for gold and silver.

CHEM 409 Organic Chemistry for Chemical Science 2 — A general course covering properties, preparations and reactions of all major classes of organic compounds--aliphatic and aromatic hydrocarbons, halides, alcohols, ethers, carboxylic acids and their derivatives, aldehydes, ketones, amines, amino acids, carbohydrates, heterocyclics, dyes and polymers. Lab work emphasizes organic techniques, qualitative chemical analysis and instrumental methods, infra-red, ultraviolet and gas chromatography.

CHEM 414 Analytical Chemistry 2 — Introduces the basic principles of analytical instruments and their application to a variety of analyses. Major topics include analytical absorption methods (visible, ultraviolet, infrared and atomic absorption), emission methods (flame, spectrographic, ICP), x-ray flouresence and diffraction methods, chromatographic methods (gas and HPLC), electrochemical methods (PH, specific ion, polarography) and trace analysis (electrothermal atomization, hydride generation, etc.).

CHEM 416 Analytical Instrumentation 1 — Covers the construction of electrodes and the use of operational amplifiers in the following analytical methods: constant current coulometric titration, amperometric, potentiometric and polarographic methods. Phototransducers and photometric circuits.

CHSC 103 Engineering Materials — Physical testing of materials including metals, plastics, wood and wood products, concrete, ceramics and soils. Non-destructive testing. Microscopy, photomicrography and photography.

CHSC 119 Environmental Science — An introductory course in environmental chemistry and pollution control. The course examines the major air and water pollutants, including measurement techniques and engineering control methods. Laboratory sessions cover sampling methods now used by industry in B.C.

CHSC 202 Laboratory Workshop — Instruction in basic workshop techniques including glass blowing, soldering, brazing and gas welding. Use of hand and bench tools.

CHSC 203 Engineering Materials — Continuation of CHSC 103.

CHSC 246 Industrial Chemical Processes — A description of the chemical processes involved in major industrial chemical plants in B.C. Emphasis is placed on chemical operations associated with the pulp and paper industry including chemical pulping, water treatment. Lab sessions involve the testing and control procedures utilized in industrial applications.

CHSC 304 Physical Metallurgy — Solidification of metals, casting methods and defects, metal-forming operations, phase diagrams, alloying of metals, heat-treatment. Lab sessions emphasize physical testing of materials, metallography and nondestructive testing. Prerequisite: CHSC 156.

CHSC 307 Extractive Metallurgy — Is concerned with the unit operations of coal and nonferrous metals recovery and upgrading, and with the unit processes of nonferrous and previous metal recovery from ores and concentrates. Mineral processing covers the basic operations of comminution, particle size analysis, classification, screening, flotation, gravity separation. Extractive metallurgy covers the fundamental principles and processes of hydrometallurgy, pyrometallurgy and electrometallurgy. Solutions to design and operating problems are emphasized.

CHSC 311 Pollution Science and Organic Chemistry — An introduction to organic chemistry, with applications to industrial pollution problems.

CHSC 320 Unit Project — Projects relating to the student's chosen specialty are assigned each term. Regular progress reports and a final term report are required. Industrial and laboratory training is emphasized.

CHSC 341 Unit Operations — First and second law of thermodynamics; enthalpy, entropy, phase rule, thermodynamic diagrams and tables; properties of steam; fluid flow and measurement in pipes and channels, piping, pipe fittings and valves; flow of heat, conduction, convection, radiation, film and overall transfer co-efficients, heat exchangers; principles and application of equipment for evaporation, distillation, absorption, extraction; humidification and dehumidification; drying; solid-liquid and liquid-liquid extraction.

CHSC 346 Pulp and Paper — Pulp and paper technology is concerned with mechanical and kraft pulping, chemical and heat recovery, bleaching, papermaking, newsprint manufacture, process control and product testing. The lab portion of this course is designed to equip students with basic testing skills and provide "hands-on" experience with typical mill unit operations. Projects are undertaken in term 4 to involve students in planning and carrying out practical project work.

CHSC 404 Physical Metallurgy — A continuation of CHSC 304. Prerequisite: CHSC 304.

CHSC 408 Ore Analysis — A survey of analytical methods to determine the elemental constituents of ores, concentrates, alloys and metal products. Laboratory work includes principles and practice of gravimetric, volumetric, complexometric and spectrophotometric methods of analysis.

CHSC 411 Pollution Science and Microbiology — Discusses air pollution meteorology, air pollution chemistry, air sampling methods, classical and instrumental techniques for measuring atmospheric and indoor contaminants (e.g. hydrogen sulfide, mercaptan, sulfur oxides, carbon monoxide, ozone, nitrogen oxides, various organic contaminants and lead, mercury, cadmium

and zinc in air, etc.), particulate counting and sizing, stack sampling and some of the principles and techniques used in water pollution microbiology. Laboratory sessions include standard methods used by industrial and government laboratories.

CHSC 412 Waste Management — Physical, biological and chemical methods used in treating municipal and industrial waste waters. The major industrial techniques for control of air pollutants are also discussed.

CHSC 413 Environmental Analytical Methods — Surveys suitable methods of examining many types of water, waste water and materials related to control of water quality. Typical industrial pollution problems related to local industry are discussed during lab periods and special attention is given to proper sampling techniques. A selection is made from the following analysis of field samples; cyanide, pesticides, arsenic, mercury, nitrogen (ammonia, nitrate, organic), oxygen (D.O., B.O.D., C.O.D.), surfactants, phosphates, sulphates, chlorides, proteins, carbohydrates, lignins, phenols and heavy metals.

CHSC 420 Unit Project — see CHSC 320.

CHSC 438 Coal Chemistry — An introduction to coal chemistry with emphasis on coal preparation and coal testing techniques.

CHSC 441 Unit Operations — see CHSC 341.

CHSC 446 Pulp and Paper — see CHSC 346.

CHSC 448 Industrial Chemistry — A survey course covering the major chemical process industries. Lecture material is selected from the following topics; chlorine and caustic production, aluminum production, petroleum refining, metal refining, plastics, phenol and resins, coal hydrogenation, nuclear energy and other sources of energy.

ELEC 468 Process Measurements — An orientation course with emphasis on lab exposure to industrial equipment. Standard methods of applying commercial instruments to measure pressure, level flow and temperature variables are included. The course ends with an introduction to the principles of regulators and controllers.

MATH 141 Basic Technical Mathematics for Chemical Sciences — Graphical linear programming. Exponential/logarithmic theory and transformations, common and natural logarithms and logarithmic/semilogarithmic graphs. Radian measure. Trigonometric functions of any angle, vectors and solution of triangles, graphs of trigonometric functions, identities, compound and double angle formulas, trigonometric equations, and inverse functions.

MATH 241 Statistics 1 and Calculus 1 for Chemical Science — Organization and graphical presentation of data, frequency distributions, measures of central tendency and variation, probability theory, random variables, theoretical distributions, sampling and estimation. Delta-process, the derivative, differentiation rules, implicit differentiation, related rates and applied maxima/minima. The indefinite and definite integrals with applications. Trapezoidal and Simpson's rules for numerical integration. Related rate problems with functions of several variables.

MATH 341 Numerical Method with BASIC for Chemical Sciences — BASIC arithmetic and functions, input/output statements, relational operations, branching statements, formatted output, strings, arrays, and files. Gauss-Jordan method applied to the solution of systems of linear equations, solution of algebraic and transcendental equations by iterative methods, linear programming using the simplex method.

MATH 441 Calculus 2 and Differential Equations for Chemical Sciences — Differentiation and integration of logarithmic and exponential functions with applications. Tables of integrals. Differential equations including variables separable and linear first order with applications. Computer application of Euler's, Heun's and Runge-Kutta's methods for solving differential equations.

MECH 103 Drafting Fundamentals

NGAS 403 Process Dynamics — Introduces a practical and effective computer based approach for studying and evaluating 'real time' process control situations. The student is required to produce interim progress reports during the course and a final, formal technical report at the end of the course. Topics include: system dynamics, response time, control strategies, system optimization, system modelling, flow charting, transducer and control valve evaluation.

PHYS 114 Physics for Chemical Sciences — An introductory level course covering kinematics, dynamics, function, statics, angular motion, energy, momentum, simple machines, properties of matter, fluid mechanics, temperature and heat, thermal properties of matter, basic electricity and magnetism, wave motion and sound, electromagnetic waves, optics, atomic and nuclear phenomena. The lab program stresses measurement, data analysis, experimental technique and report writing. Mathematical treatment requires algebra and trigonometry.

PHYS 214 Physics for Chemical Sciences — see PHYS 114.

TCOM 102 Technical Communication for Chemical Sciences — Introduces students to the techniques and tools used in communicating technical information to people in industry. Students will practice basic skills, learn to analyze information and design an information package — letter, memo proposal or report — for industrial audiences.

TCOM 202 Technical Communication for Chemical Sciences — Students will write a resume and job application letter, and prepare for job interviews. They will do library research, write several short reports, give an oral report, and practice effective meeting strategies and telephone techniques. Prerequisite: TCOM 102.

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